



NOT MEASUREMENT
SENSITIVE

DOE-STD-3025-2022

Supersedes
DOE-STD-3025-2007

DOE TECHNICAL STANDARD

QUALITY ASSURANCE INSPECTION AND PERFORMANCE TESTING OF HIGH EFFICIENCY PARTICULATE AIR AND ULTRA LOW PENETRATING AIR FILTERS



U.S. Department of Energy
Washington, D.C. 20585

Available to the public on the Department of Energy
Technical Standards Program Web site at:
<https://www.standards.doe.gov>

FOREWORD

The United States Department of Energy (DOE) performs quality assurance inspections and performance testing of High Efficiency Particulate Air (HEPA) filters and Ultra Low Penetrating Air (ULPA) filters. This DOE Standard is approved for use by DOE and its contractors for inspection and performance testing of HEPA and ULPA filters.

This Standard was developed for application in DOE and National Nuclear Security Administration (NNSA) programs. This Standard was developed in the format required by the DOE Technical Standard Program May 2015 Style Guidance. This Standard incorporates the filter independent testing requirements described in the Secretary of Energy's June 4, 2001, letter to the Chairman of the Defense Nuclear Facilities Safety Board (DNFSB).

A working group comprised of subject matter experts drawn from DOE, contractors, and industry was used to prepare the Standard. This revision incorporates appropriate recommendations from affected DOE and NNSA programs, including manufacturers, purchasers, users, and technical experts.

This 2022 version of the Standard includes information for the testing of ULPA filters. In addition, filters that have passed performance testing, but have incorrect manufacturer labeling may be forwarded to the Sites to be dispositioned in coordination with the manufacturer unless stated otherwise in the purchase order.

Beneficial comments (recommendations, additions, deletions) and any pertinent data that may improve this document should be emailed to nuclearsafety@hq.doe.gov or sent to:

Office of Nuclear Safety (AU-30)
Office of Environment, Health Safety and Security
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, D.C. 20585

DOE technical standards, such as this Standard, typically do not establish requirements but can provide guidance or direction. However, all or part of the provisions in a DOE standard can become requirements under the following circumstances:

- (1) The standard is explicitly required in a regulation, invoked in a DOE directive, or included in a contract; or

- (2) The organization makes a commitment to meet this standard by contract or in an implementation plan or program plan

Where this Standard is required to be met for one of the reasons above, the “shall” statements in this Standard are considered as requirements for the facilities and activities. The “should” statements in this Standard are considered recommendations and are not required.

Table of Contents

ACRONYMS	v
1.0 SCOPE	1
2.0 PURPOSE	1
3.0 APPLICABILITY	1
4.0 GENERAL REQUIREMENTS	1
4.1. Qualification of Filters to be Installed in Nuclear Facilities	2
4.2. Quality Assurance Inspection and Performance Testing of Filters at a DOE- approved FTF	2
4.2.1 HEPA Filter General Performance Testing Requirements	3
4.2.2 ULPA Filter General Performance Testing Requirements	3
5.0 FILTER TEST FACILITY PROCEDURES	4
5.1. Receipt of Filters Processes	4
5.1.1 FTF Receipt Inspection.....	4
5.1.2 Initial Handling and Storage.....	5
5.1.3 Pre-Test Filter Inspection.....	5
5.2. Penetration and Resistance Testing Considerations	6
5.2.1 Testing Requirements and Test Methods.....	6
5.2.2 Approved Test Aerosols	7
5.3. Inspection and Test Reports and Labeling Requirements	7
5.3.1 FTF Inspection and Test Reports for HEPA and ULPA Filters	7
5.3.2 FTF Labeling	9
5.4. FTF Personnel Expectations	10
5.4.1 Personnel Qualification.....	10
5.4.2 Training.....	12
5.4.3 Documentation.....	13
5.5. Reporting Requirements	13
5.5.1 Test Data Summary	13
5.5.2 Report Format	14
5.5.3 Status Report.....	14
5.6. Contacts with Filter Manufacturers	14
5.7. Waiver and Filter Media Repair	14
5.8. Equipment Maintenance and Calibration	15
5.9. Document Control and Records Management	15

6.0	REFERENCES.....	15
6.1.	Federal Regulations, Department of Energy Standards and Publications.....	15
6.2.	Other Standards.....	16
6.3.	Other References.....	16
APPENDIX A.	HEPA AND ULPA FILTER TEST REPORT.....	A-1
APPENDIX B.	LABEL EXAMPLES	B-1
APPENDIX C.	SEMIANNUAL REPORT FORMAT	C-1
APPENDIX D.	MONTHLY STATUS REPORT FORMAT	D-3

ACRONYMS

ACFM	Actual Cubic Feet per Minute
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
AU-30	Office of Nuclear Safety
DNFSB	Defense Nuclear Facilities Safety Board
DOE	Department of Energy
DOP	Di-octyl Phthalate
DOS	Di-octyl Sebacate
FTF	Filter Test Facility
HEPA	High Efficiency Particulate Air
IEST	Institute of Environmental Sciences and Technology
In wg	Inches water gauge
MPPS	Most Penetrating Particle Size
NIST	National Institute of Standards and Technology
NNSA	National Nuclear Security Administration
Pa	Pascal
PAO	Poly-alpha Olefin
PSL	Polystyrene Latex
SCFM	Standard Cubic Feet per Minute
ULPA	Ultra Low Penetrating Air

Intentionally Blank

1.0 SCOPE

This Standard establishes essential elements or characteristics of a U.S. Department of Energy (DOE) program for independent inspection and performance testing of High Efficiency Particulate Air (HEPA) and Ultra Low Penetrating Air (ULPA) filters to be installed in radiological or nuclear facilities as required by the Secretary of Energy's June 4, 2001, letter to the Chairman of the Defense Nuclear Facilities Safety Board (DNFSB), 100 Percent Quality Assurance (QA) Testing of HEPA Filters at the Filter Test Facility (FTF).

2.0 PURPOSE

The purpose of this Standard is to establish the requirements for performing independent quality assurance inspection and performance testing for HEPA and ULPA filters at a DOE approved filter test facility (FTF) prior to HEPA and ULPA filter acceptance or installation by the site.

3.0 APPLICABILITY

This Standard applies to the DOE FTF, which performs the quality assurance inspection and testing described in this Standard. The typical filter received at the FTF consists of a glass fiber medium. However, there are many classes of HEPA filters using other medium, such as high-strength, metal, and ceramic, which are currently under various stages of testing, development and review by the American Society of Mechanical Engineers (ASME) Committee on Nuclear Air and Gas Treatment or the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE). These classes of filters will be considered for testing at the FTF if the qualification requirements of ASME AG-1, *Code on Nuclear Air and Gas Treatment* have been met or the filters have been successfully analyzed for use in an approved site safety analysis.

4.0 GENERAL REQUIREMENTS

The FTF shall maintain and implement a DOE-approved Quality Assurance Program, which is qualified by the DOE in accordance with the contract.

The FTF shall independently inspect and test HEPA and ULPA filters in accordance with Section 5.0 of this Standard, the purchaser's written specifications, procurement documents, and any special written instructions from the purchaser.

4.1. Qualification of Filters to be Installed in Nuclear Facilities

The FTF shall not test any HEPA filter model unless the filter is qualified prior to purchase in accordance with DOE Standard, DOE-STD-3020, *Specification for HEPA Filters Used by DOE Contractors*.

Legacy filters, such as certain encapsulated filters, that are described in DOE-STD-3020 are required to be tested at the FTF but are exempt from qualification requirements. Prototype filters are required to be tested at the FTF, but can be exempt from qualification by an approved site safety analysis.

ULPA filters shall be able to meet the requirements of Institute of Environmental Sciences and Technology, IEST-RP-CC007, *Testing of Ultralow Penetration (ULPA) Filters*, and IEST-RP-CC001, *HEPA and ULPA Filters*.

Qualification requirements for ULPA filter models prior to purchase will be specified in the next revision of DOE-STD-3020.

4.2. Quality Assurance Inspection and Performance Testing of Filters at a DOE-approved FTF

Prior to installation in a DOE nuclear facility, HEPA filters are independently inspected and tested at the FTF in accordance with DOE-STD-3020. Filters rated below 20 actual cubic feet per minute (ACFM) airflow that are ULPA filters will be tested at the FTF in accordance with Institute of Environmental Sciences and Technology publications IEST-RP-CC001 and IEST-RP-CC007.

Unless otherwise instructed by site purchase order, FTF inspections and tests shall include:

- Visual inspection for compliance with purchase order (e.g., type, size, quantity received, and shipping damage).
- Visual inspection for manufacturing defects and compliance with construction and materials requirements as shown in DOE-STD-3020 for HEPA filters or purchaser specifications.
- Penetration testing at 100% rated airflow for all filters.
- Penetration testing at 20% for filters with rated airflow of 125 ACFM (212 m³/hr) and higher.

- Airflow resistance testing at 100% of rated airflow.

The FTF will notify the site, the Office of Nuclear Safety (AU-30), and the manufacturer within five working days of any filter that fails testing. The test report of the filter that failed testing will be provided with the notification.

4.2.1 HEPA Filter General Performance Testing Requirements

HEPA filter maximum penetration allowed is 0.03% at an aerosol particle diameter of 0.3 micrometers. If a penetration greater than 0.03% is measured, the filter shall be rejected, and purchaser notified in writing with the test results that indicate the filter does not meet the penetration requirements.

The resistance shall be reported to the nearest 0.1 inches water gauge (in wg) or 25 Pascal (Pa). Maximum airflow resistance for HEPA filters is shown in DOE-STD-3020 or as otherwise noted in ASME AG-1 at rated airflow. DOE-STD-3020 contains the following tables related to maximum airflow resistance at rated airflow:

- Table 5-1. Nominal Sizes and Ratings for FC HEPA Filters;
- Table 5-3. FK Type 1 Radial Flow HEPA Filters - Nominal Rating; and
- Table 5-4. FK Type 2 Axial Flow Circular HEPA Filters - Nominal Rating.

4.2.2 ULPA Filter General Performance Testing Requirements

ULPA filters rated below 20 ACFM that are to be used as a safety component in DOE nuclear facilities shall be inspected and tested per the purchase order or the latest versions of IEST Standards. If no testing requirements are identified in the purchase order for filters rated below 20 ACFM, the FTF will request that the purchaser provide the test procedures, or the filter will not be tested until a test procedure is specified. The purchaser should ensure that the factory conducts testing with the most penetrating particle size (MPPS). The purchaser should provide the allowable penetration to the FTF as it can vary depending on the ULPA filter model purchased. Allowable penetration specified should be no more than 0.0010% at the rated flow. Particle size for test aerosols for ULPA filters should be specified in the purchase order. The default MPPS for ULPA filters is a 0.1 micrometer diameter.

5.0 FILTER TEST FACILITY PROCEDURES

All FTF operations shall be conducted in accordance with written procedures that conform to this Standard and its DOE-approved quality assurance program. All FTF procedures shall contain specific acceptance criteria. The FTF procedures shall also cover the following functions:

- Receipt inspection.
- Un-boxing, handling, re-boxing, and storage of filters.
- Inspection for defects, damage, and compliance with purchase order specifications.
- Performance of physical measurements as necessary to determine if dimensional requirements, squareness requirements, and pleat curvature requirements are met.
- Verifying that the arrow label is attached in the correct air flow direction.
- Documentation and records keeping as specified in the FTF contract.
- Operations and calibration procedures for each penetration and resistance test device.
- Test and inspection reports, including disposition, retention to be available as records to DOE upon request.
- Labeling of accepted and rejected filters.
- Segregation and disposition of rejected filters.
- Shipping of accepted or rejected filters.
- Preparation of status reports.
- Preparation of monthly and semiannual reports to DOE.
- Training and qualification of personnel.

5.1. Receipt of Filters Processes

5.1.1 FTF Receipt Inspection

Any filter shipment received without a previously transmitted purchase order shall not be processed for testing until the appropriate purchase order is received. All filter packages, crates, and pallets accepted shall be inspected upon receipt at the FTF. Any damage must be noted on the Bill of Lading before signing. The FTF has the option of declining receipt of any packages with excessive damage. Upon acceptance, damaged cartons, and cartons improperly oriented

shall be opened immediately and the filters inspected. A description of any observed damage shall be recorded on the filter inspection and test report. The state of the shipping container needs to be verified that it is in compliance with the applicable sections of DOE-STD-3020, followed by further verification that there are no fasteners (e.g., nails, screws, etc.) protruding into the container that could potentially damage filters or place workers at risk of injury while handling filter packages.

5.1.2 Initial Handling and Storage

Filter handlers shall be properly trained to handle filter cartons correctly. Cartons shall be oriented with arrows on the filter cartons pointed "up". Filter cartons shall be stacked not more than three (3) high, and pallets shall not be stacked on top of one another, or other material stacked on top of filter pallets. Filters shall be stored in a clean, dry location. Storage facilities for filters shall be equipped with temperature controls to meet storage requirements specified in DOE-STD-3020.

5.1.3 Pre-Test Filter Inspection

Prior to testing, each filter shall be visually examined for possible damage, compliance with applicable sections of DOE-STD-3020 or purchaser's specifications, and workmanship. Damage to filters noted during the pre-test inspection shall be recorded on the filter inspection and test report shown in Appendix A, Part 1, HEPA and ULPA Filter Test Report, and Part 2, Visual Inspection Checklist. Damaged filters shall not be tested but shall be immediately reported to the purchaser for disposition. An exception to this requirement is when the only defect is related to labeling on the filter or packaging.

The inspection shall include verification of general workmanship, filter type, size, gasket installation and material, separators, frame dimension and material, squareness of rectangular filters, parallelism of media face, face guards (or galvanized mesh), and required labels or markings. Filters inspected with only labeling or marking deficiencies shall be tested and forwarded to the purchaser with an added label identifying the deficiency.

Squareness of filters is determined by using the requirements of Section FC in ASME AG-1. Filters shall be inspected for looseness of filter packs, excessive slump or distortion, loose gaskets, breaks or tears, or patching of the filter media.

Manufacturer's labels shall be legible and contain information as specified in ASME AG-1 as well as test data, manufacturer's test date, and medium area. In addition, the FTF shall verify that any existing air flow label is pointing in the correct direction.

5.2. Penetration and Resistance Testing Considerations

5.2.1 Testing Requirements and Test Methods

Following visual inspection, each filter, completely encased in the test apparatus, shall be tested for penetration at 100% of the rated airflow, and filters rated at 125 ACFM (212 m³/hr) or greater shall also be tested at 20% of rated airflow. For encapsulated filters, a special housing may be required to ensure the filter is encased within the test apparatus. Each filter, except encapsulated filters, shall be tested for resistance to airflow at 100% of the rated airflow. Test air flow rates shall be measured in ACFM. If approved in writing by the DOE, conversion to standard cubic feet per minute (SCFM) is not required. Test conditions are required to be shown on all test reports. The filter test apparatus shall be equipped with "chucks", which encase the HEPA filter in the test position. Encapsulated filters shall not be routinely tested for resistance to airflow. Operating, calibration, and test procedures shall be prepared for each test device and shall include, as a minimum, the following elements:

- Filling of the generator reservoir and verification of fluid level.
- Daily verification of airflow rates using National Institute of Standards and Technology (NIST) traceable orifice plates. Flow rates shall be adjusted such that the inclined manometer reading is within +/- 0.02 in. wg of the orifice plate calibration value.
- Adjustment and verification of critical airflows (and temperatures for thermal test method only).
- Calibration of filter test equipment, which determine particle size, penetration, and resistance.
- Calibration of instruments, which are used to calibrate the filter test equipment.
- Equipment maintenance and calibration schedules.
- Design and use of adapters to permit tests of non-standard filters or special test procedures.
- Operation, service, and maintenance of test equipment, including the system exhaust air cleaning device.

For penetration and resistance testing, the following types of Penetrometer Systems are authorized that use approved test aerosols.

- As to be determined by the most recent contract use the Q-107 or preferred laser method for testing filters with rated airflows greater than or equal to 250 ACFM (425 m³/hr).
- As to be determined by the most recent contract use the Q-76 or preferred laser method for testing filters with rated airflows less than 250 ACFM (425 m³/hr).

DOE shall be notified in writing of any proposed modification to the FTF equipment or testing protocols. Modifications shall be approved in advance by DOE.

5.2.2 Approved Test Aerosols

Test aerosol materials currently approved by DOE for HEPA and ULPA filter penetration testing are di-octyl phthalate (DOP), also known as DEHP, di-octyl sebacate (DOS), also known as DEHS, and poly-alpha olefin (PAO). Polystyrene latex (PSL) spheres with 0.3 micrometer diameter may also be used but only when testing filters made with glass fiber media in accordance with IEST-RP-CC007. Other aerosol materials may be approved for use by DOE after evaluation by the Office of Nuclear Safety. The DOP and DOS aerosols may be generated by a thermal aerosol generator to produce 0.3 micrometer aerosols. Alternatively, a Laskin nozzle can be used to generate and heterodisperse DOP and DOS aerosols and a laser particle counter can be used to measure the amount of maximum penetrating particle sized aerosols for testing filters. Particle size for testing HEPA filters is specified at 0.3 micrometers. Particle size for test aerosols for ULPA filters should be specified in the purchase order as the required particle size can vary based on the ULPA filter purchased. The default MPPS for ULPA filters is a 0.1 micrometer diameter.

5.3. Inspection and Test Reports and Labeling Requirements

5.3.1 FTF Inspection and Test Reports for HEPA and ULPA Filters

Upon completion of quality assurance inspections and performance tests, the FTF shall provide a written report of test data to the purchaser in accordance with Appendix A.

Additional information regarding the serial number and calibration due date of all measuring and test equipment should also be provided upon request. Reasons for rejection of any filters shall be included in the report and the rejected filters shall be specifically identified. The FTF shall

provide the purchaser with a written test report, however, the site is responsible for tracking any rejected nonconforming items in accordance with its Quality Assurance program.

The test report form shall include, as a minimum:

- Identification of the FTF;
- Name of customer;
- Purchaser order number;
- Date shipped;
- Date of shipment received;
- Date of inspection and test;
- Purchaser's specification or standard (if applicable);
- Filter manufacturer;
- Filter description (model or designation number);
- Rated flow (SCFM);
- Test conditions:
 - Test air temperature;
 - Test air humidity;
 - Barometric pressure; and
 - Test flow (ACFM).
- Signature and printed name of testing technician or electronic signature;
- Signature and printed name of qualified individual approving the report or electronic signature;
- Serial number of each filter tested;
- Resistance (in. wg or Pa) across filter pack at rated airflow;
- Penetration test at 100% rated airflow for all filters;
- Penetration test at 20% for filters with rated airflow of 125 ACFM (212 m³/hr) and higher;
- Number ordered;
- Number received;

- Number accepted;
- Initials of individual(s) reviewing the purchase order for the required testing information for the filter shipment received;
- Initials of testing technician for each individual filter;
- If applicable, indicate the cause for rejection:
 - P = Penetration;
 - R = Resistance;
 - D = Damage; and
 - O = Other: as described in Part 2 of Appendix A.

5.3.2 FTF Labeling

5.3.2.1. Accepted Filters

Each accepted filter shall be identified with a properly secured FTF "Accepted" label (green). An "Accepted" label design is shown in Appendix B. The "Accepted" label shall include the following:

- Identification of the FTF;
- Filter serial number;
- Resistance at rated airflow;
- Penetration test at 100% rated airflow for all filters;
- Penetration test at 20% for filters with rated airflow of 125 ACFM (212 m³/hr) and higher; and
- Date tested.

5.3.2.2. Rejected Filters

Each rejected filter shall be identified with a properly secured FTF "Rejected" label (red/orange). This label can be a single- or double-sided label and shall be attached to the filter. The "Rejected" label design is shown in Appendix B. Rejected filters are then segregated and reported to the purchaser prior to disposition. The following information is included on the rejection label:

- Indication of rejection;

- Identification of the inspector and date;
- Purchase order number and purchaser;
- Filter serial number;
- Findings (including rejection codes);
- Where applicable (i.e., when tested):
 - percent penetration;
 - resistance in in. wg; and
 - flow at 100% and 20%.

5.3.2.3. Accepted Filters with Incorrect Manufacturer Labeling

Each accepted filter that passed performance testing but has incorrect labeling attached by the manufacturer that does not meet the requirements of DOE-STD-3020 shall be identified with a properly secured FTF "Accepted Caution" label (yellow). See the "Accepted Caution" label design in Appendix B.

5.4. FTF Personnel Expectations

All personnel who inspect, test, directly supervise, or interpret the results of inspections and tests of HEPA and ULPA filters at the FTF shall be qualified in accordance with Section 5.4.1 of this Standard. All personnel who handle filters, including shipping, receiving, and materials-handling personnel, shall be trained in the requirements for proper handling, stacking, and storage of filters.

5.4.1 Personnel Qualification

The FTF shall ensure that personnel selected to conduct, supervise, or interpret the results of FTF inspections and tests are qualified by experience, formal training, or instruction, and are physically capable of carrying out the functions for which they are responsible. Personnel qualification shall be documented, retained, and stored at FTF for inspection by DOE.

Personnel assigned to handle the filters shall be instructed in the proper procedures and shown to be qualified for conducting the following activities:

- Handling, stacking, storing, un-boxing, re-boxing, crating, and placing filters on pallets.

- Operation of appropriate materials handling equipment, such as fork-lift industrial trucks, hoists, or conveyers.
- Verifying compliance with inspection and testing requirements as determined by supervisor review
- Inspection for shipping damage, correct orientation, and proper stacking at time of receipt.
- Preparation of filters for shipping, including the proper orientation, packaging, and proper loading in transport vehicles.

Personnel responsible for the inspection and testing of filters, shall have formal training and demonstrated performance verified by direct supervision. Those in supervision of inspection and testing personnel shall have formal training and demonstrated comprehension. The personnel responsible for the interpretation of inspection and test results shall have formal training and demonstrated comprehension as verified by direct supervision in the following:

- All applicable provisions of this Standard.
- Differences in applicable specifications provided by the DOE sites for filters to be tested at FTF.
- Materials, construction, and performance specifications of filters.
- Use and interpretation of filter specifications and purchase criteria, with particular attention to ASME AG-1 Sections FC and FK and the Institute of Environmental Sciences and Technology publication IEST-RP-CC007.
- Performance specifications and the calibration of test devices and other instruments used at the FTF.
- Procedures for handling, inspection, testing, data recording, labeling, and disposition of accepted and rejected filters.
- Proficiency in the operation, adjustment, and maintenance of the FTF instruments and equipment.
- All applicable Quality Assurance requirements (e.g., DOE Order 414.1D, *Quality Assurance*, and ASME NQA-1, *Quality Assurance Requirements for Nuclear Facility Applications*).

In addition to the items above, prior to being granted the authority to sign data forms and reports attesting to the accuracy and completeness of the reported data or result, personnel shall have demonstrated proficiency in the following:

- Data evaluation and analysis, including validation of test results.
- Interpretation of applicable standards, specifications, and purchase-order requirements relative to the acceptability of filters.
- Determination of the appropriate rejection status when compliance with all specified requirements cannot be demonstrated.
- Preparation and issuance of appropriate documentation of inspection and test results.
- Identification of materials of construction and certifications, and compliance of filters to such certifications.

5.4.1.1. Physical Qualifications

Personnel responsible for supervision of inspection and testing activities or for interpretation of inspection and test results shall demonstrate appropriate physical qualifications necessary to conduct those operations. They shall include the following:

- Visual acuity, including near vision, and depth perception.
- Physical capability for performing job related tasks.
- Hearing acuity.

5.4.2 Training

Personnel responsible for HEPA filter inspection and testing supervision of inspection and testing activities, or the interpretation of inspection and test results, shall satisfactorily complete a formal training course. This course shall address the principles of HEPA filter testing. The course shall be equivalent to the Harvard University School of Public Health In-Place Filter Testing Workshop. New hires shall receive on-the-job training and instruction by qualified personnel. Training should also be provided to verify an individual's knowledge of IEST-RP-CC007 and IEST-RP-C001. Personnel shall have familiarity with the development of MIL-STD-282, *Filter Units, Protective Clothing, Gas-Mask Components and Related Products: Performance Test Methods* and ASME AG-1. FTF management is responsible for establishing ongoing personnel training maintenance programs and re-certification programs that assure personnel remain qualified as described in Section 5.4.1 to carry-out required FTF activities.

5.4.3 Documentation

Physical and technical qualifications of personnel responsible for inspection and testing, supervision of inspection and testing activities, and interpretation of inspection and test results, shall be documented. Documentation shall include written evidence of the dates and extent of instruction along with any formal training, and documentation shall show approval by an assigned supervisor. The supervisor's signature will certify satisfactory demonstration of the individual's ability to perform relevant job functions.

All FTF personnel training and health records, certifications, and qualifications shall be retained and stored in water-and fire-resistant locked containers in accordance with its DOE-approved quality assurance program. These records will be made available to DOE for inspection and review to assure they meet DOE requirements.

Personnel training records shall be retained for the duration of the FTF contract and as specified in Section 5.9. Recertification of skills is to be required at intervals defined in facility operating procedures.

5.5. Reporting Requirements

The FTF shall prepare accurate monthly and semi-annual reports describing test activities for those periods, including a tabulation of test data as described below. Copies shall be sent to DOE as specified by the FTF contract. Further distribution of filter test data reports shall be at the discretion of DOE.

5.5.1 Test Data Summary

For each monthly and semiannual report, a summary of filter test data during the report period shall be presented in tabular format separated by rows of filter purchasers and so recorded. The report shall provide the following data:

- Name of purchaser;
- Name of filter supplier;
- Purchase order number;
- Rated airflow ACFM;
- Number of filters received/inspected;

- Number of filters tested;
- Number of filters accepted;
- Number of filters rejected; and
- Reason for rejected filters [as specified in Appendix C].

5.5.2 Report Format

The format of the monthly and semiannual reports shall be as specified in Appendix C. Narrative information, including explanations of trends or problems observed during the report period, shall also be provided. The monthly report can be modified based on the approval of DOE.

5.5.3 Status Report

A Status Report shall be prepared at a minimum on a monthly basis. The Status Report shall provide accurate information on the status of orders received and filters tested. The format of the Status Report is shown in Appendix D.

5.6. **Contacts with Filter Manufacturers**

FTF contact with HEPA and ULPA filter manufacturers shall preclude the potential for conflicts of interest. When questions arise regarding HEPA and ULPA filters being tested by the FTF, contact between the FTF and filter manufacturers will normally be limited to the following unless preapproved by the purchaser:

- Notices of shipping damage.
- Responses to manufacturer's requests for information about filter receipt and test schedules.
- Queries by the FTF concerning manufacturer's instructions for disposition of rejected filters.

5.7. **Waiver and Filter Media Repair**

Filter testing shall be performed as specified in DOE-STD-3020 or as specified in the purchase order. When authorized and agreed to in writing by the purchaser and the FTF manager, the FTF may accept minor deviations from certain specification provisions, provided that the minor deviations do not affect the basic performance of the filter. The purchaser shall maintain this documented disposition in accordance with its Quality Assurance program. However, filters that fail penetration or resistance tests shall not be accepted with any waiver, nor shall the FTF attempt to repair damage to the filter media. It shall be the responsibility of the purchaser and

manufacturer to determine disposition of those filters that do not pass either penetration or resistance tests.

5.8. Equipment Maintenance and Calibration

In accordance with the DOE approved FTF quality assurance program, FTF equipment (e.g., pressure and temperature measurement instruments, orifice plates, mass-flow meters, and other instruments critical to the performance of tests) shall be properly maintained and calibrated using qualified personnel and NIST traceable standards in accordance with specified frequencies. Calibration reports and certifications shall be maintained by the FTF and shall be available to DOE upon request.

5.9. Document Control and Records Management

The FTF shall maintain controlled access to all stored records, data, and other technical information generated in the performance of quality assurance inspection and performance testing of filters. Documents shall be maintained in a safe and secure manner to prevent tampering and water or fire damage. The FTF shall transfer to DOE all data and records at the conclusion of the contract period in accordance with the contract provisions. These shall include, but are not limited to, personnel qualification records, logs of filter tests, and instrument calibration records.

6.0 REFERENCES

The following References either form a part of this Standard to the extent specified herein, or specify requirements for filter quality assurance inspection, or testing. Unless otherwise stated in contract requirements, the current issue date and revision number of a referenced document at the time of inspection or testing shall apply, including addenda and amendments. In the event of a conflict between provisions of this Standard and provisions of the Reference Standards, the text of this Standard shall take precedence.

6.1. Federal Regulations, Department of Energy Standards and Publications

DOE Order 414.1D, *Quality Assurance*

DOE-STD-3020, *Specifications for HEPA Filters used by DOE Contractors*

6.2. Other Standards

ASME AG-1- Version agreed to in contract, *Code on Nuclear Air and Gas Treatment*

ASME NQA-1- Version agreed to in contract, *Quality Assurance Requirements for Nuclear Facility Applications*

IEST-RP-CC007, *Testing of Ultralow Penetration (ULPA) Filters*

IEST-RP-CC001, *HEPA and ULPA Filters*

MIL-STD-282, *Filter Units, Protective Clothing, Gas-Mask Components and Related Products: Performance Test Methods*

6.3. Other References

The Secretary of Energy's June 4, 2001, letter to the Chairman of the Defense Nuclear Facilities Safety Board, *100 Percent Quality Assurance (QA) Testing of HEPA Filters at the Filter Test Facility (FTF)*

APPENDIX A. HEPA AND ULPA FILTER TEST REPORT

PENETRATION AND RESISTANCE TEST RESULTS (Part 1)

						Page	of
CUSTOMER		TEST CRITERIA		NUMBER ORDERED	DATE RECEIVED:		
		PENETRATION FOR HEPA		NUMBER RECEIVED			
PURCHASE ORDER NUMBER		RESISTANCE			DATE TESTED		
		IN. WG. @ 100% RATED FLOW					
FILTER MODEL NUMBER		SPECIFICATION		NUMBER ACCEPTED	DATE SHIPPED		
MANUFACTURER		TEST CONDITIONS		REJECTS			
FILTER DESCRIPTION		Test Air Temperature °F	Test Flow (ACFM)	PENETRATION	RESISTANCE		
P.O. Reviewed By:	Rated Flow (SCFM)	BAROMETRIC PRESS mm Hg.	Test Air Humidity in % RH	DAMAGE	OTHER		
ITEM No.	FILER SERIAL NUMBER	INSPECTION RESULTS		TEST RESULTS			FILTER TESTED BY:
				RESISTANCE	% PENETRATION		
					100%	20%	
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
DISTRIBUTION				TESTED BY:			
				APPROVED BY:			

VISUAL INSPECTION CHECK LIST (Part 2)

Customer: _____ P.O. #: _____ Date: _____

Specific Reference for Acceptance Criteria: _____

RECEIPT INSPECTION

	Satisfactory	Unsatisfactory	N/A
Number of Filters Per Shipping Papers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Filters Received Upright (pleats vertical)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cartons/Filters Undamaged	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Crates/Pallets Undamaged	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Characteristics As Specified In Purchase Order or Specifications:

Comments: Add information such as the serial numbers of filters not passing inspection and those accepted with waiver.

		Satisfactory	Unsatisfactory	N/A
Number of Filters		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Frame Material		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Frame Construction		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gaskets	Type	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Location/Size	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Construction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Capacity:		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
UL-586 Label		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Faceguards		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Separators:		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Required Labels/Marking/Identification		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exposed Edges of Metal Frame Sealed		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Frame Edges/Faces Free of Splinters/ Rough Edges		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gaskets Secure and Undamaged		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fluid Seal Gasket Undamaged		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No Damage to Filter Media		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Filter Dimensions		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Squareness of Frame		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hidden Shipping Damage		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Filter Pack Tightness		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Filter Workmanship		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other:		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Inspected by: _____

Approved by: _____

APPENDIX B. LABEL EXAMPLES

Accepted Label (Green)

FILTER TEST FACILITY			
Address			
DOE Contract: _____			
Filter Serial Number: _____			
FILTER TEST RESULTS			
Resistance (in wg)	% Penetration at 100% Flow	% Penetration at 20% Flow	Date of Test
ACCEPTED			

Accepted Caution Label (Yellow)

FILTER TEST FACILITY			
Address			
DOE Contract: _____			
Filter Serial Number: _____			
FILTER TEST RESULTS			
Resistance (in wg)	% Penetration at 100% Flow	% Penetration at 20% Flow	Date of Test
CAUTION: Incorrect Manufacturer's Labeling			

REJECTED

FILTER TEST FACILITY

Address

Inspector:	Date:
------------	-------

FILTER TEST RESULTS			
Resistance (in wg)	% Penetration at 100% Flow	% Penetration at 20% Flow	Date of Test

* Rejection Codes

D – Damage P – Penetration

O – Other R – Resistance

APPENDIX C. SEMIANNUAL REPORT FORMAT

This Appendix shows the report format and includes the required tabular data that will simplify extracting data for analysis. Other aspects of the semiannual reports, including any narrative, shall also be provided.

Purchaser	Supplier	P O Number	Rated Flow (cfm)	Number Received/ Inspected	Number Tested	Number Accepted	Number Rejected	Reasons for Rejection					
								Resistance	Penetration	Manufacturing Defects	Does Not Meet PO and/or Spec	Shipping Damage	Reason for Rejects
Subtotal													
Total													

MONTHLY REPORT FORMAT

This Appendix shows the report format and includes the required tabular data that will simplify extracting data for analysis. Other aspects of the monthly reports, including any narrative, shall also be provided.

**DOE FILTER TEST FACILITY
MONTHLY REPORT
Month 20XX**

Purchaser	Supplier	P O Number	Rated Flow (cfm)	Number Received/ Inspected	Number Tested	Number Accepted	Number Rejected	Reasons for Rejection					
								Resistance	Penetration	Manufacturing Defects	Does Not Meet PO and/or Spec	Shipping Damage	Reason for Rejects
Subtotal													
Total													

Intentionally Blank

APPENDIX D. MONTHLY STATUS REPORT FORMAT**Month Year*****Orders on Hold***

Date Rec'd	Hold Reason	Purchaser	Purchase Order Number	Item #	Mfg.	Size (cfm)	Qty.	Notes
							Total	

Orders Ready

Date Rec'd	Hold Reason	Purchaser	Purchase Order Number	Item #	Mfg.	Size (cfm)	Qty.	Notes
							Total	

Filters Rejected, Waiting Manufacturer Shipping Info

Date Rec'd	Hold Reason	Purchaser	Purchase Order Number	Item #	Mfg.	Size (cfm)	Qty.	Notes
							Total	

Intentionally Blank