

Procurement Specification for Standard, Nuclear Grade, High-Efficiency Particulate Air (HEPA) Filters

(For ASME AG-I Section FC Compliant Filters)

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract 89303320DEM000030



P.O. Box 1464
Richland, Washington 99352

Procurement Specification for Standard, Nuclear Grade, High-Efficiency Particulate Air (HEPA) Filters

(For ASME AG-I Section FC Compliant Filters)

Project No: N/A Document Type: SpecP Program/Project: ALL CPCC PROJECTS

K. J. Leist
Central Plateau Cleanup Company LLC (CPCCo)

Date Published
November 2025

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract 89303320DEM000030

 **CPCCo**
Central Plateau
Cleanup Company
P.O. Box 1464
Richland, Washington 99352

APPROVED

By Dorcas Kosgei at 2:10 pm, Feb 02, 2026

Release Approval

Date

DATE:

Feb 02, 2026

**HANFORD
RELEASE**

Release Stamp

TRADEMARK DISCLAIMER

Reference herein to any specific commercial product, process, or service by tradename, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

This report has been reproduced from the best available copy.

Printed in the United States of America

Total pages: 30

**Central Plateau Cleanup Company
RECORD OF REVISION (ROR)**

1. Document Number:
HNF-S-0552

2. Title:
Procurement Specification for Standard, Nuclear Grade, High-Efficiency Particulate Air (HEPA) Filters (For ASME AG-1 Section FC Compliant Filters)

CHANGE CONTROL RECORD

3. Revision	4. Description of Change - Replace, Add, and Delete Pages	Authorized for Release			
		5. DA/TA	6. Date		
0	EDT 618909, Dated 1/15/97		1/15/1997	+	X
1	ECN 656298, revised to include on-site storage requirements and safety class		10/25/1999	+	X
2	ECN 650237, revised to include comments from manufacturers and facilities.		6/7/2000	+	X
3	ECN 665575, revised to include comments from manufacturer and facilities.		6/5/2001	+	X
4	ECN 671459, revised to remove non-specification information, including on-site storage requirements.		3/26/2002	+	X
5	HNF-EDC-05-25204, complete rewrite, formatted to align with DOE-STD-3020-97; eliminated Non AG-1 material and design options; added mandatory Filter Test Facility requirement; added supplemental information to clarify AG-1 requirements; eliminated option for non QL-1 procurements; eliminated note allowing the QPL to be used in lieu of Supplier qualification testing; provided FH/Vendor/ASME committee AG-1-related interpretations; and added an AG-1 exception/deviation process.	PM O'Brian	3/30/2005	+	X
6	PRC-EDC-1Q-4 6076, updated to ASME AG-1-2009 edition, revised to remove limitations on how filters are fabricated, and revised data sheet.	RT Hallum	5/13/2010	+	X
7	General update to incorporate current revisions of DOE, national consensus codes standards (principally ASME AG-1-2019). Also added new Supplier QA requirement to provide media qualification testing data to support HEPA program storage/service life extension as recommended by CPCC-00295	KJ Leist	4/23/2024	+	X
8	Remove Filter Test Facility from the specification scope in accordance with US Department of Energy - Hanford Field Office letter 25-NSD-0012 direction.	KJ Leist		+	X
				+	X
				+	X
				+	X
				+	X
				+	X
				+	X
				+	X
				+	X
				+	X

DA/TA Authorized for Release:

Leist, Kendrick J Digitally signed by Leist, Kendrick J
Date: 2025.11.19 07:09:37 -08'00'

Print First and Last Name

Signature / Date

PROCUREMENT SPECIFICATION FOR
STANDARD NUCLEAR GRADE HIGH EFFICIENCY PARTICULATE AIR
(HEPA) FILTERS

(For ASME AG-1, Section FC Compliant Filters)

HNF-S-0552, Revision 8

TABLE OF CONTENTS

Contents

TABLE OF CONTENTS	1
1. SCOPE	1
1.1 PURPOSE.....	1
1.2 APPLICABILITY	1
1.3 LIMITATIONS	2
2.0 DEFINITIONS AND ABBREVIATIONS	2
2.1 DEFINITIONS	2
2.2 ABBREVIATIONS.....	3
3.0 REFERENCES.....	3
3.1 CODES, STANDARDS, AND SPECIFICATIONS.....	3
4.0 REQUIREMENTS	5
4.1 GENERAL REQUIREMENTS.....	5
4.2 MATERIAL REQUIREMENTS	6
4.3 DESIGN REQUIREMENTS	7
4.4 PERFORMANCE REQUIREMENTS.....	10
4.5 FABRICATION REQUIREMENTS	10
5.0 INSPECTION AND TESTING	12
5.1 QUALIFICATION TESTING	12
5.2 FILTER PRODUCTION TESTING.....	13
6.0 MARKING AND IDENTIFICATION	14
6.1 FILTER MARKING AND IDENTIFICATION	14
6.2 PACKAGE MARKING AND IDENTIFICATION	15
7.0 PACKAGING, SHIPPING, AND STORAGE	15
7.1 PACKAGING	15
7.2 SHIPPING.....	16
7.3 STORAGE	16
8.0 QUALITY ASSURANCE	17
8.1 QUALITY ASSURANCE PROCUREMENT CLAUSES.....	17
8.2 SUPPLIER QUALITY ASSURANCE PROGRAM.....	18
8.3 SCHEDULE	18
8.4 PERSONNEL QUALIFICATIONS/CERTIFICATIONS	19

8.5	DELIVERABLES	19
9.0	EXCEPTIONS	19
9.1	PROPOSED/TENTATIVE ASME AG-1 CHANGES.....	19
9.2	HEPA FILTER SME INTERPRETATIONS AND CLARIFICATIONS	20
9.3	PRE-AWARD ASME AG-1 EXCEPTIONS.....	20
9.4	POST-AWARD ASME AG-1 EXCEPTIONS	20
10.0	ACCEPTANCE OF ITEMS	21
APPENDIX A		22
HNF-S-0552 HEPA FILTER DATA SHEET (REVISION 8).....		22
HNF-S-0552 HEPA FILTER DATA SHEET (REVISION 8).....		23

1. SCOPE

This procurement specification establishes performance, design, construction, inspection, and testing requirements for Standard (ASME AG-1, Section FC compliant), Nuclear Grade, High-Efficiency Particulate Air (HEPA) filters intended for use in Hanford nuclear air-cleaning system applications.

1.1 Purpose

The purpose of this specification is to ensure that procured HEPA filters are acceptable in all respects to ASME AG-1 specified performance, design, construction, acceptance, and testing requirements.

Filters procured per this specification meet Washington Administrative Code (WAC), Chapter 246-247 regulatory requirements for applying ASME AG-1 compliant abatement technology. This specification also incorporates select supplemental requirements from Department of Energy (DOE) standard, DOE-STD-3020(current revision), *Specification for HEPA Filters Used by DOE Contractors*.

NOTE(S) for Hanford-Buyers

(1) All filters procured using this specification shall be ordered as Quality Level-1 (Ref. CPCC-MP-QA-599).

(2) Hanford Project Contractors, including their subcontractors shall use this specification when procuring ASME AG-1, Section FC compliant HEPA filters.

(3) For procurement of non-standard HEPA filters (i.e., not ASME AG-1, Section FC compliant) use specification HNF-S-0477.

1.2 Applicability

1.2.1 This specification applies to extended-media dry-type HEPA filters for use in air and gas streams with a maximum continuous temperature of 250° F (120° C).

1.2.2 This specification applied to filters intended for use in regulated (WA State) and safety-based confinement ventilation systems

1.2.3 Only HEPA Filter types A and C, defined in Subarticle FC-4100 are allowed per this specification.

1.3 *Limitations*

- 1.3.1 This specification applies only to ASME AG-1, Section FC compliant HEPA filters; therefore, filter sizes are limited to sizes identified in ASME AG-1, Table FC-4110-1.
- 1.3.2 This specification does not allow procurement of HEPA filters with Mini-pleat medium (Type B filters per ASME AG-1 Paragraph FC-4100.)

2.0 **DEFINITIONS And Abbreviations**

2.1 *Definitions*

Acceptance Test: Inspection and testing of a filter to verify certain characteristics or properties which determine the acceptance or rejection of that filter.

Airflow Resistance: An index of the energy required to maintain airflow through a filter. Airflow resistance is measured in terms of the air pressure difference (pressure drop) across a filter at a specified flowrate.

NOTE: *Non-CPCCo Contractors on the Hanford Site electing to use this specification for HEPA procurements shall designate an individual to serve in a HEPA SME capacity for their respective companies.*

HEPA Filter SME: The HEPA SME is the CPCCo-assigned HEPA Filter Subject Matter Expert. The HEPA SME is the Buyer's Technical Representative for all CPCCo HEPA procurements. Since the HEPA SME is typically not the assigned Technical Authority for the installed system, the HEPA SME must coordinate the resolution of procurement issues with the ordering engineer, as appropriate.

High Efficiency Particulate Air (HEPA) Filter: A disposable, extended-media, dry-type filter with a rigid casing enclosing the full depth of the pleats. The filter shall exhibit a minimum efficiency of 99.97% when tested with an aerosol of essentially mono-dispersed 0.3 micrometer diameter test aerosol particles.

Non-Standard Filters: Nuclear grade HEPA filters that are not fully compliant to the requirements of ASME AG-1 Section FC, *HEPA Filters*. Non-standard filters include those filter designs, shapes and sizes that are not recognized by ASME AG-1, Section FC (e.g., cylindrical, radial, and enclosed (self-contained) filters) and authorized filter designs that have not been qualified by the manufacturer. Non-Standard filters are generally procured with HNF-S-0477 (not applied by this specification).

Penetration: The downstream test aerosol concentration, expressed as a percentage of the upstream test aerosol concentration.

Qualification Test: A test, often destructive, of a prototype or randomly selected production filter to verify its capability to meet certain functional and specification requirements. Test results are considered to typify performance of filters of the same design and manufacturing process.

Rated Flow: The flowrate at which HEPA filters are identified by the manufacturer. Nominal airflow ratings are identified in ASME AG-1, Table FC-4110-1.

Standard Filters: Nuclear grade HEPA filters that are fully compliant with ASME AG-1 Section FC, *HEPA Filters* requirements.

2.2 ***Abbreviations***

acfm	actual cubic feet per minute
ANSI	American National Standard Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
AVS	Acquisition Verification Services
CPCCo	Central Plateau Cleanup Company
DOE	Department of Energy
HEPA	High Efficiency Particulate Air
QA	Quality Assurance
QPL	Qualified Product List
RFQ	Request for Quote
scfm	standard cubic feet per minute
SME	Subject Matter Expert
UL	Underwriters' Laboratories
WAC	Washington Administrative Code
wg	Water Gauge

3.0 **REFERENCES**

3.1 ***Codes, Standards, and Specifications***

As a minimum, documents referenced below are part of this specification to the extent specified herein. The latest document edition and addenda shall apply unless otherwise noted.

Note: *All ASME AG-1 references made in this document are based on ASME AG-1-2023.*

3.1.1 American Society of Mechanical Engineering (ASME)

ASME AG-1-2023	Code on Nuclear Air and Gas Treatment
- Division I	General Requirements, Section AA, Common Articles
Division II	Ventilation Air Cleaning and Ventilation Air Conditioning, Section FC, HEPA Filters
ASME NQA-1-2008/2009a	Quality Assurance Requirements for Nuclear Facility Applications (Revision as defined by PRC-MP-QA-599)

3.1.2 American Society for Testing and Materials (ASTM)

ASTM A 240/ A 240M	Standard Specification for Heat-Resisting and Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels
ASTM A 740-	Standard Specification for Hardware Cloth (Woven or Welded Galvanized Steel Wire Fabric)
ASTM B 209	Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM D 1056	Standard Specification for Flexible Cellular Materials- Sponge or Expanded Rubber
ASTM E 84	Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E 2016	Standard Specification for Industrial Woven Wire Cloth

3.1.3 Engineered Wood Association

APA PS-1	Voluntary Product Standard PS-1 for Construction and Industrial Plywood
----------	---

3.1.4 Institute of Environmental Sciences and Technology

IEST-RP-CC-007.1	Testing ULPA Filters
------------------	----------------------

3.1.5 U.S. Department of Energy Standards

DOE-STD-3020-2015	Specification for HEPA Filters Used By DOE Contractors
DOE-STD-3025-2022	Quality Assurance Inspection and Testing of HEPA Filters

3.1.6 Underwriters Laboratories

UL 586	Standard for Safety, High Efficiency, Particulate, Air Filter Units
--------	---

3.1.7 Washington Administrative Code

Chapter 246-247

Radiation Protection – Air Emissions

4.0 REQUIREMENTS

Note: *References to ASME AG-1 Section FC requirements are made throughout this specification. The Section FC references and requirement excerpts provided herein are not intended to imply non-applicability of any Section FC requirement which is not specifically included. Unless explicitly stated otherwise, all ASME AG-1, Section FC requirements apply.*

4.1 General Requirements

- 4.1.1 Supplier shall provide HEPA Filters in accordance with this specification.
- 4.1.2 Physical attributes of a filter (e.g., size, material, configuration, etc.) shall be as specified in the associated HNF-S-0552, Appendix A (*HEPA Filter Data Sheet*.) Anticipated filter service conditions are included. If any conflict exists between ASME AG-1, this specification, the HEPA Filter Data Sheet, or Purchase Order (PO) requirements, the Supplier shall request formal direction from the Buyer on how to proceed, prior to initiating fabrication.
- 4.1.3 The HEPA Filter Data Sheet may include additional or supplemental testing and documentation requirements. When included, such requirements are also conditions for filter acceptance.
- Note:** *While the intent of this specification is to ensure HEPA filter conformity with all aspects of ASME AG-1, this specification acknowledges clarifications, interpretations, and exceptions are sometimes needed to facilitate the procurement process. The purpose, extent, and applicability of these exceptions are documented in Section 9.0 of this specification.*
- 4.1.4 HEPA filters procured to this specification shall meet all ASME AG-1, Section FC requirements, unless otherwise approved in accordance with Section 9.0.
- 4.1.5 Upon request, HEPA Filter SME will consider revising this specification to allow procurement of additional filter types and/or material options providing new products and features meet the design, fabrication, testing, and qualification requirements of ASME AG-1.

4.2 *Material Requirements*

4.2.1 General

Materials of construction shall conform to ASME AG-1, Article FC-3000, unless otherwise exempted in accordance with Section 9.0 of this specification.

- Use of alternate materials and material substitutions shall be identified and submitted to the Buyer for review and approval prior to initiating fabrication.
- Not all materials authorized for use by ASME AG-1 are authorized for use per this specification (e.g., cadmium plated steel.) Where applicable, material restrictions are noted in the material sections in which they apply.

4.2.2 Filter Case Material

Structural filter case material shall conform to ASME AG-1, Subsubarticle FC-3110.

4.2.3 Gasket Material

Gasket material shall conform to ASME AG-1, Subsubarticle FC-3120. Depending on frame type, the following two methods are acceptable for sealing a filter to its mounting frame. The two methods shall not be used concurrently on the same mounting frame.

Note: *For select applications, the HEPA Filter SME may authorize use of thicker gasket material (see Step 9.2.1 for purpose and applicability).*

- a. Gasket(s) shall conform to ASME AG-1, Paragraph FC-3121. Gaskets shall be oil-resistant, expanded (closed-cell) elastomer in accordance with ASTM D 1056, Grade 2C3 / 2C4. Gaskets shall be ¼ inch (6 mm) thick by ¾ inch (19 mm) wide with split or cut surfaces (i.e., no mold skin).
- b. Gelatinous Seal (Fluid Seal) shall conform to ASME AG-1, Paragraph FC-3122.

4.2.4 Filter Media

Filter media shall conform to ASME AG-1, Subsubarticle FC-3130, Section FN, and the following:

- If specified on the HEPA Filter Data Sheet, Supplier shall provide filter media with enhanced chemical resistance properties for use in exhaust systems with potential HNO₃ (nitric) or HF (hydrofluoric) acid exposure.

- Asbestos is not an acceptable filter medium component.

4.2.5 Faceguards

Faceguard material shall be as specified on the HEPA Filter Data Sheet. This specification authorizes the use of either of the following:

- a. Metallic faceguard fabricated in accordance with ASME AG-1, Subsubarticle FC-3140.

Note: Galvanized faceguards shall not be used in combination with stainless steel case material, or in any application involving potentially corrosive airstreams.

4.2.6 Adhesives and Sealants

Adhesives and sealants used to fasten gaskets to the filter frame, seal filter pack into the case, and attach faceguards to the frame shall conform to ASME AG-1, Subsubarticle FC-3150.

- Material shall be self-extinguishing, so that when dried or cured adhesive/sealant is subjected to spot-flame test of ASME AG-1 (Subsubarticle FC-5160) or UL-586 it will not continue to support combustion after the source of combustion has been removed.

4.2.7 Separators

If separators are specified, separator material shall conform to ASME AG-1, Subsubarticles FC-3160 and FC-4150.

Note:

- Filter Separator features shall be as specified in the HEPA Filter Data Sheet.

4.2.8 Fasteners

Fasteners used in the fabrication of the filter case shall conform to ASME AG-1, Article AA-6000 and Paragraph FC-3111.

4.3 *Design Requirements*

4.3.1 Filter Design

Note: *This specification applies to Type A and Type C filter designs only. Procurement of Type B filter designs is **not** authorized per this specification.*

- Filter design shall conform to ASME AG-1, Article FC-4000.
- Filter designs for flows other than those listed in ASME AG-1, Table FC-4110-1 are permitted providing minimum ratings of Table FC-4110-1 and requirements of Subsubarticle FC-4120 are met.

4.3.2 Filter Case

Filter case shall be designed and constructed in accordance with ASME AG-1, Subsubarticle FC-4120 and Article FC-6000, respectively.

a. Metal Case

Metal cases shall have a ¾-in (19 mm) wide double-turned flange on each face or a fluid-seal socket per ASME AG-1 Figure FC-4142-1 and as specified by the HEPA Filter Data Sheet. The gasket sealing surfaces shall be square with the sides of the frame (i.e., within 3°) and be flat and parallel. Space between abutting panel sections shall be made leak tight with adhesive. There shall be no rough edges that might penetrate or cut workers gloves or injure the fingers of personnel handling the filters.

b. Wood Case

Wood case panels shall be joined with rabbeted joints and be assembled using an approved adhesive (see 4.2.6) followed by double nailing or double screwing using coated box nails, galvanized screw nails, or galvanized flat head wood screws. Points of fasteners shall not penetrate the inside or outside surfaces of the case. If fluid seal is required, filter frame shall have a routed channel 3/8 inch (9 mm) wide x ¾ inch (19 mm) deep. Inner surfaces and exposed edges of frame shall be thoroughly coated with sealant to minimize permeability. The finished case shall have no splinters or rough edges that present a puncture hazard for the worker.

4.3.3 Media Filter Pack

Filter pack shall conform to the applicable Type (A or C) requirements per ASME AG-1, Subsubarticle FC-4130. Filter packs shall be made from a continuous sheet of filter medium and shall be pleated evenly to form a pack of equal depth throughout. No media patching is allowed.

a. Type-A (filters with separators):

Filter media pack shall not extend beyond the exposed ends of the separators. Separators should extend approximately 1/8 inch (3 mm) beyond

the pleats of medium. Separators shall not extend beyond the ends of the frame when the pack is bonded to the frame. The plane formed by the edges of the separators should be at least ¼ inch (6 mm) from the plane of the filter frame (less gasket). Filter pack shall be rigid within the frame and separators shall be perpendicular to the two opposing parallel sides of the frame. Pleats shall be straight and perpendicular to the case, and shall not deviate more than 1/4 inch (6 mm) from a line drawn from one end of the pleat to the other. To protect the media, separators shall be provided with a “turned” or “hemmed” edge prior to corrugation.

b. Type-B (mini-pleat) filter pack is **not** authorized per this specification.

c. Type-C (separatorless filters):

Type-C (separatorless) filters shall have corrugated or embossed media folded in a manner that the filter pack is self-supported by the convolutions of the adjacent folds. When additional support is appropriate, dividers fabricated from materials compatible with the intended service shall be provided. The vertical plane formed by the ends of the folded media shall not deviate more than 3/8 inch (9 mm) from the top to the bottom of the pleat, and shall be recessed at least 1/16 inch (1.6 mm) from the plane formed by the four sides of the filter frame. Where convolutions do not have crest-to-crest contact, spacing shall not be less than 1/16 inch (1.6 mm). The nesting of convolutions and abrupt kinks or deviations in the folds of the medium are not permitted. Trimmed edges of the filter element shall be firmly potted (fixed) into the sealant. The two flat edges shall have sufficient sealant to secure them to the frame sides. The media pack shall be rigid within the frame.

4.3.4 Gaskets

Filter gaskets shall be designed in accordance with ASME AG-1, Subsubarticle FC-4140.

a. Elastomer gasket construction shall conform to ASME AG-1, Figure FC-4110-1 and Paragraph FC-4141. Gaskets shall be glued firmly and continuously to the case on one or both faces, as specified in the HEPA Filter Data Sheet. Loose, peeling, or distorted gaskets are cause for rejection. The gasket shall not extend beyond more than 1/16 inch (1.6 mm) over either side of the seating surface at any point. Gaskets shall be either one piece or made up of strips joined at the corners by a notched or dovetail interlocking type joint. A gasket shall contain no more than four joints. Edges of the joint areas shall be thoroughly coated with adhesive.

- b. Gelatinous Seal (Fluid Seal) construction shall conform to ASME AG-1 Paragraph FC-4142.

4.3.5 Separators

Separators shall be capable of withstanding continuous service under all specified operating conditions without swelling, sagging, or melting as required per ASME AG-1 Subsubarticle 4150.

4.3.6 Face Guards

Faceguards shall be installed on each face of the filter in accordance with ASME AG-1, Subsubarticle FC-4160.

4.4 Performance Requirements

Supplier-performed production testing shall be performed in accordance with ASME AG-1, Subarticle FC-5300.

4.4.1 Test Aerosol Penetration

Aerosol penetration for a HEPA filter shall not exceed 0.03% (0.0003) when challenged with essentially mono-dispersed particles of approximately 0.3 micrometer diameter, as required per ASME AG-1 Subsubarticle FC-4210. Penetration tests shall conform to ASME AG-1 Subsubarticle FC-5120.

4.4.2 Airflow Resistance

Per ASME AG-1 Subsubarticle FC-4220, resistance to air flow across a clean HEPA filter at rated flow shall meet the requirements of ASME AG-1, Table FC-4110-1.

4.5 Fabrication Requirements

4.5.1 HEPA filter fabrication shall conform to ASME AG-1, Article FC-6000.

4.5.2 Filter Tolerances

Allowable tolerances for filter dimensions shall not exceed values per ASME AG-1, Subarticle FC-6210. Tolerances are summarized below.

Table 1
Filter Case Tolerances

RECTANGULAR FILTER CASES (Tolerances from AG-1, Sub-subarticle FC-6210)		
Parameter	Filter Size (Nominal)	Allowable Tolerance
Face Dimensions (outside length and width dimensions)	Size equal to 24 inch x 24 inch (610 mm x 610 mm)	+0, -1/8 inch (+0 mm, -3 mm)
	Size less than 24 inch x 24 inch (610 mm x 610 mm)	+0, -1/16 inch (+0 mm, -1.6 mm)
Depth (dimension excludes gaskets)	all filters	+1/16, -0 inch (+1.6 mm, -0 mm)
Flatness and Parallelism of Face	all filters	1/16 inch (1.6 mm)
Squareness (total allowance for opposing corner-to-corner diagonals for each face).	all filters	1/8 inch (3 mm)

4.5.3 Media Installation

Media installation shall conform to ASME AG-1 Subsubarticle FC-6220. Patching of holes or tears in the media is not permitted.

4.5.4 Faceguard Installation

Faceguard edges shall be firmly embedded in adhesive inside the filter case, but not under the gasket, or enclosed within a metal "picture frame" for metal frame filters. Faceguards shall be installed such that projecting wires cannot puncture or abrade the media, or present a puncture hazard to personnel handling the filter.

4.5.5 Workmanship

Workmanship shall be in accordance with AG-1, Subarticle FC-6300.

5.0 INSPECTION and TESTING

5.1 *Qualification Testing*

5.1.1 Filter Media Qualification Test

Filter media qualification testing shall be performed in accordance with ASME AG-1, Section FN (Article FN-4000 and FN-5000).

- a. As a minimum, media qualification testing shall demonstrate physical and chemical properties of media meet or exceed performance requirements as specified in the following:
 - Airflow resistance per FN-4210
 - Aerosol penetration per FN-4220
 - Tensile strength per FN-4230
 - Water repellency per FN-4240
 - Thickness per FN-4250
 - Combustible material per FN-4260
 - Flexing Characteristics per FN-4270
 - Resistance to Radiation per FN-4234 and FN-4242
 - Workmanship per FN-4300
- b. Filter media shall be re-qualified at least every five years by an independent test facility.
- c. If a filter fails any or all of the requalification tests, the Supplier shall notify the Buyer that the filter model failed requalification.

5.1.2 Filter Design Qualification Test

Filter qualification testing shall be performed in accordance with ASME AG-1, Article FC-5000. Filters submitted for qualification testing shall be either prototypes of the proposed design, or production filters of the specific design randomly selected from Manufacturer's stock.

- a. Independent qualification testing shall demonstrate performance of an assembled filter meets or exceeds ASME AG-1 performance requirements. As a minimum, qualification testing shall consist of the following:
 - Resistance to Airflow per FC-5110
 - Test Aerosol Penetration per FC-5120
 - Resistance to Rough Handling per FC-5130
 - Resistance to Pressure per FC-5140
 - Resistance to Heated Air per FC-5150

- Spot Flame Resistance per FC-5160

Note: *As allowed per AG-1, Subsubarticles FC-5150 and FC-5160, an Underwriter's Laboratories UL-586 label shall be acceptable objective evidence for demonstrating compliance to heated air and spot flame test requirements.*

- b. Filter designs shall be re-qualified at least every five years by a certified independent test facility.

5.2 Filter Production Testing

- 5.2.1 Each filter shall be tested for aerosol penetration and resistance to airflow in accordance with ASME AG-1, Subarticle FC-5300. Production testing shall provide objective evidence that each filter meets the performance requirements of FC-4210 and FC-4220.
- 5.2.2 Test results (i.e., penetration and resistance at rated airflow) and the date of testing shall be identified on the filter nameplate/label.

6.0 MARKING AND IDENTIFICATION

6.1 Filter Marking and Identification

- 6.1.1 Marking and labeling for each HEPA filter shall conform to the requirements of ASME AG-1 Subarticle FC-9100 and the requirements of this specification.
- 6.1.2 Filter case marking and identification shall include the following:
 - Manufacturer's Name or Symbol
 - Filter Model Number
 - Filter Serial Number
 - Rated Flow Capacity
 - Test Airflow Direction
 - Resistance at 100% Rated Flow
 - Percent Penetration at 100% Rated Flow
 - Percent Penetration at 20% Rated Flow
 - UL 586 Label (**Note: UL label required in all cases**)
 - **Date of Manufacture**
 - Date of Penetration Test

- Available-to-flow medium area
- **Hanford Purchase Order (PO) Number and PO Line Item Number**
- **Procurement Specification Number and Revision**

Note: *Bolded items above represent additional labeling information that shall be provided with each filter (i.e., labeling not required by ASME AG-1).*

- 6.1.3 Review purchase order to ensure additional filter identification and labeling requirements are not applicable.

6.2 **Package Marking and Identification**

- 6.2.1 Marking and labeling for each filter carton shall conform to the requirements of ASME AG-1 Subarticle FC-9200 and the requirements of this specification.

- 6.2.2 Carton markings shall appear on a minimum of two sides, preferably on one side and the top end.

- 6.2.3 Carton markings shall include the following information:

- Manufacturer's Name or Symbol
- Orientation Arrows and any other ASME AG-1 Required Text (e.g., Fragile, etc.)
- Filter Model Number
- Hanford Purchase Order (PO) Number (**and PO Line Item Number**)
- **Filter Serial Number**
- **Procurement Specification Number and Revision**

Note: *Bolded items above represent additional (i.e., non ASME AG-1 required) labeling that shall be provided on each carton.*

7.0 **PACKAGING, SHIPPING, AND STORAGE**

Filter packaging, shipping, and storage shall conform to ASME AG-1, Article FC-7000 and ASME NQA-1 Level B requirements. Filters shall be classified and maintained as Level B items.

7.1 **Packaging**

- 7.1.1. Filters shall be individually packaged in wood or corrugated paperboard containers/cartons having corner braces, inserts, or other means of shock prevention to protect the filter during shipment, handling, and storage. Shock prevention material shall not be constructed in such a way that it

might puncture the filter medium if it comes into contact with the face of the filter.

- 7.1.2. Cartons shall be designed so that they can be opened, and the filter removed, without damage to the carton or filter, and so that the carton can be reused for shipment to alternate destinations.
- 7.1.3. Filters with fluid seals shall be packaged in a manner so as to prevent contact of the gelatinous seal sealant with any portion of the shipping carton during transport, and to minimize the potential for sealant contact with dirt or debris during AVS receipt inspection and handling.
- 7.1.4 Type-A and Type-C filters shall be packed in cartons with the pleats oriented in a vertical position.

7.2 Shipping

- 7.2.1 Shipping shall be in conformance with (ASME NQA-1, Part II, Subpart 2.2) Level B item designation requirements.
- 7.2.2 If possible, shipment shall be arranged so that the filter assemblies are not disturbed after they leave the Supplier's facility until they are received at the address designated by the Buyer.
- 7.2.3 For large shipments, it is recommended that the entire shipment be shipped in a sealed dedicated trailer or rail car. At all times, the filters must be handled with care and orientated properly. Handling requirements (unique to filters) shall be clearly visible on the shipping carton.
- 7.2.4 Unless otherwise approved by the Buyer, filters shall be shipped palletized or crated to minimize unit handling, particularly at public carrier interchange points. Standard pallet sizes shall be used by the Supplier.
- 7.2.5 Cartons shall not be stacked more than 3 high. No other materials shall be placed on top of the filters during shipment. A packing list shall be glued securely to the outside of one carton. The packing list shall clearly state if the shipment is a partial shipment. When requested and authorized by the Buyer, air freight shipments shall also be palletized in accordance with this specification.
- 7.2.6 The carrier shall be instructed that the Buyer's personnel will be responsible for unloading filters at the Buyer's receiving facility.

7.3 Storage

Storage at the Supplier's facility shall be in accordance with NQA-1, Part II, Subpart 2.2 Level B requirements as required per ASME AG-1, Section FC-7000.

8.0 QUALITY ASSURANCE

8.1 *Quality Assurance Procurement Clauses*

8.1.1 The following procurement quality assurance clauses supplement specification requirements and therefore apply to all HEPA filter procurements unless otherwise specified on HEPA Filter Data Sheet.

- B01 – QA Program Submittal and Pre-award Survey
- B04 – Supplier Quality Program Evaluation
- B32 – Identification of Items with Part Number/Model Number
- B33 – Identification of Items with Product Data Sheet
- B43 – Identification of Age Control
- B52 – Inspection and Test Report
- B79 – Certificate of Conformance

8.1.2 Review Purchase Order, it may contain additional procurement clauses.

8.2 *Supplier Quality Assurance Program*

8.2.1 Supplier shall have a documented quality program, as evaluated by NQA-1 2008 and appended by 2009 addenda, that is in conformance with ASME AG-1, Articles FC-8000 and AA-8000. The quality program shall ensure that products and services provided meet or exceed contract requirements. This program shall be evaluated by the Buyer's Quality Assurance organization. This evaluation may be waived on a case by case basis as specified on the HEPA Filter Data Sheet. The Supplier must successfully disposition any resulting findings or observations prior to award of contract.

8.2.2 Supplier's program shall be subject to review at all times by the Buyer. The Buyer reserves the right to verify the quality of work at the Supplier's facility, including the Supplier's subcontractor facilities.

8.2.3 Supplier shall, during the performance of this purchase order, submit any proposed change(s) to the quality assurance program to the Buyer for review and approval prior to implementation.

8.2.4 Supplier shall be notified by the Buyer of rejected filters, including the nature of the rejection. Unless otherwise negotiated between the Supplier and Buyer, the Supplier shall provide replacement filters until the stipulated quantity of filters is

found acceptable. The Supplier shall provide, at the discretion of the Buyer, replacement filters and/or credit for any rejected filters.

8.2.5 The Buyer may elect to have qualification testing or verification of materials performed on any filters furnished to them. Failure of any filter submitted for qualification testing to meet specification requirements shall be cause for a re-evaluation of the Supplier's quality assurance program.

8.2.6 Each shipment shall be accompanied by a Supplier's certificate of conformance which meets or exceeds the requirements of ASME AG-1, Subarticle FC-8200.

8.2.7 Supplier shall provide, in whole or in portion, a copy of the filters' Qualification testing report documentation indicating filter media tested tensile strength and water repellency test values, as determined per ASME AG-1 Paragraphs FN-4231 and FN-4241.

8.2.8 Supplier shall, upon request, show documented evidence that qualification tests have been conducted by an independent laboratory in accordance with ASME AG-1 Subarticles FC-5100 and FC-8200.

8.3 *Schedule*

See procurement documents for required delivery date(s).

8.4 *Personnel Qualifications/Certifications*

Supplier personnel performing independent inspection or verification activities shall be qualified or certified in accordance with the Supplier's Quality Assurance Program.

8.5 *Deliverables*

HEPA filters and documentation as specified per this procurement specification and its associated procurement documents. Certificate of conformance shall be in accordance with this specification and ASME AG-1, Subarticle FC-8200.

9.0 EXCEPTIONS

Note: *The intent of this specification is to assure HEPA filter conformity to ASME AG-1. However, ASME AG-1 requirement interpretations, clarifications, and exceptions may sometimes be necessary to facilitate the procurement process. This section describes the requirement interpretation and exception process.*

9.1 Proposed/Tentative ASME AG-1 Changes

Note: *The ASME AG-1 Committee is expected to revise ASME AG-1 to increase Supplier flexibility with respect to the filter qualification process and to address known material-related issues during the next revision. Tentative agreements have been made among ASME AG-1 Committee members to adopt the changes described below. Although these changes have not been formally approved, given the high probability of acceptance, and the extremely low potential for any of the items to compromise filter quality, performance, or reliability, this specification fully accepts items 9.1.1 through 9.1.4 as approved exceptions and does not consider the items to be “ASME AG-1 deviations”.*

9.1.1 Supplier performed production testing have traditionally reported HEPA filter flow rate in terms of (acfm) and have not corrected flow measurements to standard conditions (scfm), as required by Subsubarticle FC-5120. Given the locations of the factory, error associated with not correcting to standard conditions is very small. Discussions with one ASME AG-1 Section FC Sub-committee member indicates that a consensus has been reached within the FC Sub-committee that production test results should not require correction to standard conditions. Note that ASME AG-1, Table FC-4110-1 is titled as “Nominal” Sizes and Ratings, and Section FK (Special Round and Duct-Connected HEPA Filters) specifies “acfm”.

9.2 HEPA Filter SME Interpretations and Clarifications

The HEPA Filter SME acknowledges the following are not in strict accordance with ASME AG-1. However, after a HEPA Filter SME review, it was determined the items are acceptable. For purposes of this specification, the Supplier is not required to request ASME AG-1 deviations for the following:

Hanford-Users Note: *Non-standard gaskets are sometimes needed to facilitate filter sealing in select, older applications. Use of non-standard gaskets must be identified on an approved engineering drawing and shall be approved by the HEPA Filter SME prior to use. Thicker gaskets shall not be applied to new filter system installations.*

9.2.1 ASME AG-1 Figure FC-4110-1 shows the standard gasket thickness is ¼ inch (6 mm.) Where a thicker gasket is needed to maintain an effective seal, and if specified on the HEPA Filter Data Sheet, gasket thickness may exceed the ASME AG-1-specified ¼ inch (6 mm) value. However, under no circumstances shall gasket nominal thickness exceed 3/8 inch (9 mm).

9.3 Pre-Award ASME AG-1 Exceptions

With the exception of items described in Steps 9.1 through 9.3, the Supplier shall identify any FC-8200 requirement which cannot be fully satisfied. As a minimum, all exceptions shall be approved by the HEPA Filter SME.

9.3.1 Prior to award of contract, the Supplier shall identify all known requirement exceptions to the “**Request for Quotation**” (RFQ).

9.3.2 Supplier shall inform the Buyer when Supplier-determined requirement interpretations are used in lieu of demonstrating verbatim conformance to ASME AG-1 stated requirements. Upon request, the Supplier shall provide documentation to support equivalency claims.

9.3.3 All issues shall be resolved to the satisfaction of the Buyer prior to award of the contract. Resolution of issues shall be documented on the **Request for Proposal Review** Form.

9.4 Post-Award ASME AG-1 Exceptions

9.4.1 If ASME AG-1 deviations are identified after the contract has been awarded (i.e., ASME AG-1 issues not previously exempted or approved per Steps 9.1 through 9.3, the Supplier shall proceed as follows:

- a. All fabrication work associated with the filter order shall cease pending formal direction from the Buyer.
- b. Supplier shall immediately inform the Buyer of discrepancy and provide the following information:
 - Identify the specification and revision number;
 - Identify the criteria that cannot be met by the item and section number;
 - Present an explanation for the exception;
 - Present a proposal for resolution of the exception; and,
 - Present a price and schedule adjustment for resolution of the exception.
- c. The Buyer, HEPA Filter SME, ordering Engineer (as applicable), and Quality Assurance Engineer will evaluate the Supplier’s documentation and make a determination regarding the proposed resolution.
- d. All ASME AG-1 deviation requests shall be documented per the Supplier’s Non-conforming Item policy.

10.0 ACCEPTANCE OF ITEMS

Acceptance of the filter shipment will not be made by the Buyer until each filter has been accepted by an AVS Quality Assurance inspector. With the exception of damage directly attributable to either the Shipper, failure to meet inspection, test, or verification requirements shall be cause for rejection.

APPENDIX A

HNF-S-0552 HEPA Filter Data Sheet (Revision 8)

HNF-S-0552 HEPA Filter Data Sheet (Revision 8)	
CAT ID Number:	Quality Level 1 (no exceptions)
Requestor: _____ Date: _____	Generic (Site) Spare Part? <input type="checkbox"/> Yes <input type="checkbox"/> No
	Dedicated Facility Spare Part? <input type="checkbox"/> Yes <input type="checkbox"/> No
Service / Application: <i>Note: Completion of this section is required only for filters designated as Dedicated Facility Spare Parts.</i>	Potential for Wetting? <input type="checkbox"/> Yes <input type="checkbox"/> No
	Potential for Corrosive Atmosphere? <input type="checkbox"/> Yes <input type="checkbox"/> No
	Potential exposure to HNO ₃ acid? <input type="checkbox"/> Yes <input type="checkbox"/> No
	Potential exposure to HF acid? <input type="checkbox"/> Yes <input type="checkbox"/> No
	Potential for High Temperature (>250 F) <input type="checkbox"/> Yes <input type="checkbox"/> No
Enter PPOE Number:	
Parent Piece of Equipment (PPOE)	
Recommended Manufacturer: _____	
Recommended Manufacturer's part number: _____	

Required Filter Attributes	
Special Hardware Options	<input type="checkbox"/> None <input type="checkbox"/> Extractor T-Clips
Note(s):	
Temperature Rating	<input type="checkbox"/> 250° F (120° C)
Note(s):	
Filter Media	<input type="checkbox"/> 99.97% on 0.3 µm Standard Media <input type="checkbox"/> 99.97% on 0.3 µm Media with HF Acid Resistance Treatment <input type="checkbox"/> 99.97% on 0.3 µm Media with HNO ₃ Acid Resistance Treatment
Note(s):	
Filter Pack Type	<input type="checkbox"/> 4 inch Deep Separatorless <input type="checkbox"/> 11 inch Deep Separatorless <input type="checkbox"/> 4 inch Deep High-Capacity Separatorless <input type="checkbox"/> 11 inch Deep High-Capacity Separatorless <input type="checkbox"/> Aluminum Separators
Note(s):	
Frame Material	<input type="checkbox"/> ¾ Inch Thick Fire Retardant Plywood <input type="checkbox"/> 14 Gauge Type 409 Stainless Steel <input type="checkbox"/> 14 Gauge Type 304 Stainless Steel <input type="checkbox"/> 14 Gauge Type 304L Stainless Steel
Note(s):	
Frame Style	<input type="checkbox"/> Box Type Construction (For Wood Frame filters) <input type="checkbox"/> ¾ Inch Wide Double-turn Flanges on Both Faces (For metal frame filters) <input type="checkbox"/> Channel for Gel Seal (For wood or metal frame filters)
Note(s):	

Pack to Frame Sealant	<input type="checkbox"/> Fire Retardant Urethane			
Note(s):				
Gasket Type	<input type="checkbox"/> ¼" Thick Neoprene	Gasket Location	<input type="checkbox"/> Upstream face	
	<input type="checkbox"/> 3/8" Thick Neoprene (special order only)		<input type="checkbox"/> Downstream face	
	<input type="checkbox"/> Gel Seal		<input type="checkbox"/> Both faces	
		Fluid Seal Location	<input type="checkbox"/> Upstream face <input type="checkbox"/> Downstream face	
Note(s):				
Faceguard Type	<input type="checkbox"/> Galvanized Steel	Faceguard Location	<input type="checkbox"/> Both Faces Required	
	<input type="checkbox"/> Stainless Steel			
Note(s):				
Filter Size Rated Air Flow, Pressure Drop, and Size Designator (ASME AG-1, Table FC-4110-1)	<input type="checkbox"/> 8" x 8" x 3-1/16"	25 scfm	1.3 in wg	Designator: 1
	<input type="checkbox"/> 8" x 8" x 5-7/8"	50 scfm	1.3 in wg	Designator: 2
	<input type="checkbox"/> 12" x 12" x 5-7/8"	125 scfm	1.3 in wg	Designator: 3
	<input type="checkbox"/> 24" x 24" x 5-7/8"	500 scfm	1.0 in wg	Designator: 4
	<input type="checkbox"/> 24" x 24" x 11-1/2"	1000 scfm	1.0 in wg	Designator: 5
	<input type="checkbox"/> 24" x 24" x 11-1/2"	1250 scfm	1.3 in wg	Designator: 6
	<input type="checkbox"/> 24" x 24" x 11-1/2"	1500 scfm	1.3 in wg	Designator: 7
	<input type="checkbox"/> 24" x 24" x 11-1/2"	2000 scfm	1.3 in wg	Designator: 8
<input type="checkbox"/> 12" x 12" x 11-1/2"	250 scfm	1.3 in wg	Designator: 9	
Special Flow Requirement(s):				
<ul style="list-style-type: none"> • Filters must be tested per UL 586. Objective evidence shall include a UL-586 label. • FILTERS SHALL BE IN ACCORDANCE WITH SPECIFICATION HNF-S-0552, Revision 8. <p>The following QA Clauses apply:</p> <ul style="list-style-type: none"> • B01 – QA Program Submittal and Pre-award Survey • B04 – Supplier Quality Program Evaluation • B32 – Identification of Items with Part Number/Model Number • B33 – Identification of Items with Product Data Sheet • B43 – Identification of Age Control • B52 – Inspection and Test Report • B79 – Certificate of Conformance 				
Exceptions to QA clauses:				

Additional Instructions: _____

Specification Exceptions: _____

SME Approval:

Date: