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RPP-WTP.PDC

RIVER PROTECTION PROJECT – WASTE TREATMENT PLANT

ENGINEERING SPECIFICATION

FOR

Nuclear Grade High Efficiency Particulate Air (HEPA) Filters (ASME AG-1 Section FK Filters)

Content applicable to ALARA? Yes No

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24590-WTP-ADR-HV-04-0002

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SPECIFICATION No.
24590-WTP-3PS-MKH0-T0002

Rev
3

Revision History

Revision	Reason for Revision
0	Issued for Purchase
1	<p>Issued to support design development. NOT TO BE USED FOR FABRICATION OF QL-1 OR QL-2 FILTERS.</p> <p>Complete Revision. Conforms Spec to Current Project Requirements. Incorporate Spec Change Notice (SCN): 24590-WTP-3PN-MKH0-00004. SCN 24590-WTP-3PN-MKH0-00008 not incorporated. Incorporate Supplier Deviation Disposition Requests (SDDRs): 24590-WTP-SDDR-PROC-04-00134, 24590-WTP-SDDR-PROC-03-0155, 24590-WTP-SDDR-PROC-03-0193.</p>
2	<p>Issued to support design qualification testing and production.</p> <p>Completely revised. This revision includes, but is not limited to, changes to incorporate:</p> <p>1) Specification Change Notice 24590-WTP-3PN-MKH0-00018 incorporated as follows:</p> <ul style="list-style-type: none"> • 1st change: 24590-WTP-SDDR-PROC-05-00116 superceded by 24590-WTP-SDDR-HV-06-00008. This later SDDR is incorporated by reference. • 2nd change: Second sentence "If a date or revision..." not incorporated. Justification: Proposed text would violate procedure 24590-WTP-3DP-G04B-00049 Engineering Specifications, Rev. 10, Article 3.6.2. • 3rd change: Not incorporated. SCN text is no longer consistent with text as presented in RPP-WTP Safety Requirements Document Volume II 24590-WTP-SRD-ESH-01-001-02 Appendix C 35.0 (see subarticle FK-4100). • 4th change: Not incorporated. SCN text is no longer consistent with text as presented in RPP-WTP Safety Requirements Document Volume II 24590-WTP-SRD-ESH-01-001-02 Appendix C 35.0 (see Table FK-4001). For the Safe Change HEPA filter, the specification requirement article 3.2.4 is stated for a more stringent pressure drop maximum (i.e., 1.3 in.wg.) than the allowed maximum (1.6 in. wg.) as stated in the SRD. • 5th change: Incorporated. • 6th change: Editorial- The correct article cross reference has been made. <p>2) New title to clarify intent of specification on RPP-WTP.</p> <p>3) ASME AG-1 Section FK requirements, replacing Section FC requirements throughout document. Revised edition of ASME N509 from 1989 to 2002. These changes were made in accordance with CCN 128654, Approval of Authorization Basis Amendment Request 24590-WTP-SE-ENS-04-0212 Rev. 1.</p> <p>(Note: There are no SRD implementing code or standard deviations in the following changes.)</p> <p>4) Requirements to test all HEPA filters in accordance with approved Trend TN-24590-03-01317, "QA Testing of HEPA Filters at DOE Filter Test Facility". Specification Sections 1.2, 1.5, 3.1, 3.2, 6.3, 7.2, 7.3, 7.6 and 8.2.</p> <p>5) Specification requirements for Type 3 HEPA filters (used primarily for safe change HEPA housing vacuum relief during maintenance filter replacement).</p> <p>6) Remote change HEPA filter design cross-reference and criteria related to remote handling process (Specification Section 3.1).</p> <p>7) Expanded discussion regarding filter seismic qualification test plan and test report requirements (Specification Section 3.2).</p> <p>8) Added HEPA Filter Data Sheet (Appendix A).</p>

24590-WTP-3PS-MKH0-T0002, Rev 3
Nuclear Grade High Efficiency Particulate Air (HEPA) Filters
(ASME AG-1 Section FK Filters)

Revision	Reason for Revision
	9) Expanded Shipping and Handling Instructions (Specification Section 7.6). 10) Clarified code and project required supplier quality assurance (Specification Section 8.2) and submittal requirements (Specification Section 10).
3	Administrative update to source document to incorporate outstanding changes and supersede permit document no longer required by Project. Incorporated 24590-WTP-3PN-MKH0-00022. Supersedes 24590-WTP-3PS-MKH0-TP002, Rev 3.

Please note that source, special nuclear, and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA) are regulated at the U. S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts that pursuant to AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

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1 Scope

1.1 Project Description and Location

The River Protection Project-Waste Treatment Plant (RPP-WTP) is a complex of waste treatment facilities where the Department of Energy's (DOE) Hanford site tank waste will be put into stable glass form. The WTP Contractor will design, build, and start up the WTP pretreatment and vitrification facilities for the Office of River Protection (ORP). The waste treatment facilities will pretreat and immobilize the low-activity waste (LAW) and high-level waste (HLW) currently stored in underground storage tanks at the Hanford Site.

The Hanford Site occupies an area of about 560 square miles and is located along the Columbia River, north of the city of Richland, Washington. The WTP Facility will be constructed at the East End of the 200 East Area of the Hanford Site. Benton, Franklin, and Grant counties surround the Hanford Site.

1.2 Equipment, Material, and Services Required

The Supplier shall design, qualify, fabricate and test HEPA Filters in accordance with the requirements of ASME AG-1, Section FK and this specification. Two types of HEPA filter described by ASME AG-1 Section FK may be procured for the RPP-WTP using this specification:

- Type 1 Radial Flow HEPA Filters with Gelatinous Seals (FK-4111 (b) and (d)) rated for 2,000 acfm
- Type 3 Axial Flow Circular Filters with Inlet and/or Outlet Connections (FK-4114)

AG-1 required qualification testing shall be performed and certified by an independent test facility. Production of the Radial Flow HEPA Filters shall not commence until the qualification tests are successfully completed and the results are accepted by the Buyer.

This specification also incorporates select supplemental requirements from Department of Energy (DOE) standard, DOE-STD-3020-2005, *Specification for HEPA Filters Used by DOE Contractors*. This specification includes requirements to conduct independent quality assurance testing at a DOE Filter Test Facility (FTF). With the exception of replacement of FTF failed filters (i.e., 6.3), the Supplier is not responsible for FTF-applicable specification requirements (i.e., section 6.3 and FTF label application per 7.2 and 7.3).

1.3 Work by Others

- 1.3.1 Material unloading and storage at job site
- 1.3.2 Installation labor

1.4 Definition

- 1.4.1 Challenge Aerosol. Poly-disperse droplets used as challenge aerosol for testing installed HEPA filters for leaks. The poly-disperse aerosol used for leak testing of systems differs in size from the 0.3 micrometer mono-disperse DOP aerosol used for efficiency testing of individual HEPA filters by manufacturers.
- 1.4.2 Certificate of Conformance (C of C). A written statement, signed by a qualified party, certifying that items or services comply with specific requirements.
- 1.4.3 Grab Ring. Ring provided at the inlet of a Remote Change HEPA Filter to facilitate insertion and removal operations by remote systems.
- 1.4.4 HEPA Filter. High Efficiency Particulate Air Filter. A throwaway, extended-media dry type filter with a rigid casing. The filter shall exhibit a particle removal efficiency of 99.97% when tested with essentially mono-dispersed 0.3 micrometer diameter test aerosol particles.
- 1.4.5 Production Test. A test made on an individual production item to verify its performance in accordance with specified requirements.
- 1.4.6 Qualification Tests. Test performed on HEPA filters, prior to production, by an independent test facility in accordance with the requirements of ASME AG-1, Section FK-5100.
- 1.4.7 Remote Change. Remote change implies that the Remote Change HEPA filter requires an integral grab ring that works in conjunction with a mechanical filter handling tool as required for remote installation and removal.
- 1.4.8 Safe Change. Safe change implies that the Safe Change HEPA filter can be manually installed and removed by an operator without remote equipment and without breaking confinement.
- 1.4.9 Type 1. Radial flow HEPA filters as defined by ASME AG-1 Section FK-4100 and FK-4111. Also referred to as "Safe Change" and "Remote Change" HEPA filters throughout this specification.
- 1.4.10 Type 3. Axial flow circular filters as defined by ASME AG-1 Section FK-4100 and FK-4114.
- 1.4.11 Water Column (WC). The units for air pressure typically expressed in inches of water column height (e.g., 2.5-inches WC).

1.5 Abbreviations

- 1.5.1 ACFM. Actual Cubic Feet per Minute
- 1.5.2 ANSI. American National Standards Institute
- 1.5.3 ASHRAE. American Society of Heating, Refrigerating and Air-Conditioning Engineers
- 1.5.4 ASME. American Society of Mechanical Engineers
- 1.5.5 ASTM. American Society for Testing and Materials

- 1.5.6 CAS. Chemical Abstract Service
- 1.5.7 C of C. Certificate of Conformance
- 1.5.8 DOE. Department of Energy
- 1.5.9 FTF. Department of Energy Filter Test Facility
- 1.5.10 HEPA. High Efficiency Particulate Air
- 1.5.11 PPOE. Parent Piece of Equipment
- 1.5.12 RPP-WTP. River Protection Project - Waste Treatment Plant
- 1.5.13 SDDR. Supplier Deviation Disposition Request
- 1.5.14 UL. Underwriters Laboratories, Inc.
- 1.5.15 WC. Water Column

1.6 Safety and Quality Classifications

Type 1 HEPA filters provided under this Specification are expected to meet RPP-WTP Project requirements for Important-to-Safety (ITS) Safety Class (SC), Quality Level Q, and Seismic Category I service.

Type 3 HEPA filters provided under this Specification are Non-Important-to-Safety (Non-ITS), Commercial Material (CM) components and are not credited for seismic purposes (SC-V) unless otherwise stated in the procurement documentation.

2 Applicable Documents

The following documents form a part of this specification to the extent specified herein. In the event of conflict between the document referenced herein and the contents of this specification, the Buyer shall be notified of the conflict.

The latest document edition and addenda shall apply unless otherwise noted.

For the codes and standards listed below, the specific revision or effective date identified, as well as the specific revision or effective date of codes and standards that they incorporate by reference (daughter codes and standards) shall be followed. The effective dates and revisions listed in section 2 shall apply to subsequent references to the codes and standards within this specification.

2.1 ANSI/ASME – American National Standards Institute/American Society of Mechanical Engineers

- 2.1.1 ASME AG-1-1997 with ASME AG-1a-2000 Addenda, Code on Nuclear Air and Gas Treatment (Hereinafter referred to as ASME AG-1 or AG-1).

- 2.1.2 ASME N509-2002, Nuclear Power Plant Air Cleaning Units and Components.
- 2.1.3 ASME N510-1989, Reaffirmed 1995, Testing of Nuclear Air Treatment Systems.
- 2.1.4 ASME NQA-1-89, Quality Assurance Program Requirements for Nuclear Facilities.
- 2.1.5 UL-586-1990, Underwriters Laboratories Inc., Test Performance of High Efficiency Particulate, Air Filter Units.
- 2.1.6 ASME NQA-1-2004 Quality Assurance Requirements for Nuclear Facility Applicatons. (Limited Application - Packaging and Storage Requirements Only)
- 2.1.7 ASME AG-1 Section FK, Special HEPA Filters. (Although Section FK was approved by the ASME Board on Nuclear Codes and Standards on July 21, 2005 and is now considered part of the AG-1 Code, it has not yet been formally issued in a code addenda. It is available for reference at: <http://cstools.asme.org/csconnect/pdf/CommitteeFiles/16990.pdf>).

2.2 US Department of Energy Standards

- 2.2.1 DOE-STD-3020-2005, Specification for HEPA Filters Used by DOE Contractors
- 2.2.2 DOE-STD-3025-99, Quality Assurance Inspection and Testing of HEPA Filters

2.3 Other Reference Documents and Drawings

- 2.3.1 24590-WTP-3PS-MKH0-T0001, Engineering Specification for HVAC Safe Change HEPA Filter Housings.
- 2.3.2 24590-WTP-3PS-MKH0-T0003, Engineering Specification for HVAC Remote Change HEPA Filter Housings.
- 2.3.3 24590-WTP-3PS-G000-T0001, Supplier Quality Assurance Program Requirements.
- 2.3.4 24590-WTP-3PS-G000-T0003, Engineering Specification for Packaging, Handling and Storage Requirements.

2.4 Informational Reference Documents

The following codes and standards are not specifically invoked on the RPP-WTP Project, but were used to the extent referenced herein and/or by ASME AG-1 as a source of information in development of technical and performance requirements.

- 2.4.1 DOE-HDBK-1169-2003, DOE Nuclear Air Cleaning Handbook

2.5 Design Changes Incorporated By Reference

- 2.5.1 24590-WTP-SDDR-HV-06-00008 (Supercedes 24590-WTP-SDDR-PROC-05-00116)

3 Design Requirements

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

3.1 General

- 3.1.1 This specification relates to Type 1 and Type 3 circular HEPA filters as specified in ASME AG-1 Section FK. More specifically, the Type 1 HEPA filters are further described as Safe Change and Remote Change Radial Flow HEPA Filters with a maximum rating of 2,000 ACFM (950 liters per second) per filter and suitable for manual and remote change housing installations, respectively. The Type 3 HEPA filters are axial flow circular filters with a maximum rating of 120 ACFM (56 liters per second) and are typically intended for use as vacuum relief (e.g., bleed) filters for manual housing maintenance. Design of Radial Flow HEPA Filters shall conform to applicable sections of the documents listed in Section 2 of this specification.
- 3.1.2 Safe Change Radial Flow HEPA Filters shall include a gelatinous seal and be suitable for horizontal installation in multi-filter cabinet style housings specified in 24590-WTP-3PS-MKH0-T0001, Engineering Specification for HVAC Safe Change HEPA Filter Housings.
- 3.1.3 Type 1 HEPA filter performance requirement design criteria as identified in ASME AG-1 Table FK-4000-4 are specified on the HEPA Filter Data Sheets (Appendix A). Type 3 HEPA filters used for safe change housing maintenance (e.g., vacuum relief) are not subjected to deleterious environments.
- 3.1.4 Remote Change Radial Flow HEPA Filters shall include a gelatinous seal and be suitable for vertical installation in remotely operated multi-filter cabinet style housings specified in 24590-WTP-3PS-MKH0-T0003, Engineering Specification for HVAC Remote Change HEPA Filter Housings.
- 3.1.5 For design development purposes only, limiting criteria for Remote Change Radial Flow HEPA Filters are shown in Table 1. These criteria may be superseded by Supplier design drawings submitted for Buyer review and permission to proceed. The Supplier design drawings will be used to document the final design.
- 3.1.6 Design of the Type 1 (Safe Change and Remote Change Radial Flow) and Type 3 (Circular Axial Flow) HEPA Filters shall conform to applicable portions of ASME AG-1, Section FK and applicable portions of the documents listed in Section 2 of this specification. Where conflicts between the Supplier's design and ASME AG-1, Section FK, exist, the Supplier shall identify the respective code articles that do not apply and notify the Buyer (i.e., SDDR) prior to initiation of filter design qualification testing. For filter designs (e.g., Type 3) that have been previously qualification tested, the Supplier shall notify the Buyer of code conflicts during design submittal review (e.g., prior to fabrication). Deviations to ASME AG-1 Section FK requirements identified within this Specification do not require Buyer notification.

- 3.1.7 As required by ASME AG-1, Section FK-3130, filter media shall comply with ASME AG-1, Section FC, Mandatory Appendix FC-I.
- 3.1.8 Type 1 filter packs shall comply with ASME AG-1, FK-4111. Type 3 filter packs shall comply with ASME AG-1, FK-4114. Other ASME AG-1 Section FK articles pertaining to filter pack design also apply (e.g., FK-4116, -4120, -4130).
- 3.1.9 Installation and removal of the safe change filter shall be based on bag-in bag-out procedure. Installation and removal of the remote change filter shall be based upon use of a sequencing grapple that is remotely positioned onto the filter using a crane and hook. Reference 2.3.2 provides further information on this remote handling process.
- 3.1.10 The Safe Change Radial Flow HEPA Filters shall utilize a gel filled channel located on the inner diameter of the filter inlet. The channel shall be manufactured from ASME AG-1 compatible materials and either fully integrated into the filter inlet flange (preferred) or affixed in position using a construction method that shall ensure that the gel channel remains in place and does not contribute to filter bypass during operation or fail structurally during filter installation and removal.
- 3.1.11 The Remote Change Radial Flow HEPA Filters shall utilize a gel filled channel located on the outer diameter of the filter inlet. The channel shall be manufactured from ASME AG-1 compatible materials and either fully integrated into the filter inlet flange (preferred) or affixed in position using a construction method that shall ensure that the gel channel remains in place and does not contribute to filter bypass during operation or fail structurally during filter installation and removal. The Supplier shall demonstrate that the remote change filter design is capable of withstanding the loads applied during remote manipulation of the filter, without permanent deformation or deterioration of “like-new” filter performance.
- 3.1.12 Filter seals shall perform the following functions:
 - 3.1.12.1 Provide a leak tight seal between the filter and the mating surface in the housing.
 - 3.1.12.2 Accommodate maximum fabrication tolerances of the housings mating knife-edge without compromising seal integrity.
 - 3.1.12.3 The gel seal material shall remain in the gel seal channel during installation and removal cycles that would be normally expected to occur during operation of the system, as well as during design basis seismic events.
- 3.1.13 Handles on Safe Change Radial Flow HEPA Filters used for installation and removal shall:
 - 3.1.13.1 Facilitate manual handling without damage to the filter.
 - 3.1.13.2 Be attached to withstand installation and removal loads.
- 3.1.14 Grab Rings on Remote Change Radial Flow HEPA Filters used for installation and removal shall:
 - 3.1.14.1 Facilitate remote mechanical handling without damage to the filter.

- 3.1.14.2 Be attached to withstand installation and removal loads.
- 3.1.14.3 Be compatible with remotely operated mechanical systems (provided by others) to facilitate insertion and removal operations by remote systems.
- 3.1.15 Connection fittings selected for fabrication of Type 3 HEPA filters, intended for use as vacuum relief (e.g., bleed) filters, shall be compatible with the couplers specified for use on the Safe Change HEPA housings (Reference 2.3.1).
- 3.1.16 All filters shall be inspected and tested at a DOE FTF prior to Buyer acceptance.

3.2 Performance

The performance of Safe Change and Remote Change Radial Flow HEPA Filters shall conform to applicable portions of ASME AG-1, Section FK, and applicable portions of the documents listed in Section 2 of this specification, including, but not limited to the following requirements:

- 3.2.1 Filter Media Efficiency: ASME AG-1, FK-1130: 99.97% when tested with an aerosol of essentially 0.3 micron diameter test aerosol particles.
- 3.2.2 Seismic: ASME AG-1, FK-4300. Type 1 HEPA filters shall be seismically qualified as part of the filter housing by the proof testing method in accordance with ASME AG-1, Subarticle FK-4300 and AA-4350. The acceptance criteria shall be per FK-4300.
 - 3.2.2.1 The specification for the parent piece of equipment (e.g., filter housing) shall be used to document Buyer seismic test and load criteria to be used for this qualification testing.
 - 3.2.2.2 The Supplier may submit a prior report qualifying use of a filter in a given installation provided that the Supplier can prove the following:
 - The equipment proposed to be used on the WTP Project is identical to that used in the prior qualification report. If they are not identical, the Seller shall demonstrate how the differences would not affect the seismic qualification.
 - The WTP Project equipment functional requirements during and after the DBE are similar or less stringent than those in the prior qualification report.
 - Potentially significant aging mechanisms related to equipment performance as identified for the prior qualification report bound the aging characteristics expected for the given RPP-WTP system installation.
 - The equipment support used in the testing is identical to that proposed for use on the WTP Project, and, prior qualification report TRS envelopes the WTP RRS.
 - 3.2.2.3 A seismic qualification test plan shall be provided to the Buyer for review and approval prior to testing. This test plan shall be a submittal requirement of the PPOE specification and is not a submittal requirement of this specification.

- 3.2.3 Qualification Testing: ASME AG-1, FK-5100: Testing prior to acceptance and production, and certified by an independent test facility.
- 3.2.4 Resistance to Airflow: The following alternate criteria are approved for use for Type 1 HEPA filter designs regarding ASME AG-1 Articles FK-4100 and FK-5110. These resistance criteria apply when tested in accordance with paragraph FK-5120.

ASME AG-1 SECTION	SECTION FK CODE REQUIREMENT TEXT	ACCEPTED RPP-WTP REPLACEMENT REQUIREMENT TEXT
FK-4100	“The total media area provided within the filter pack shall be such that the maximum media velocity is 5 ft/min (1.5 m/min) at the rated flow.”	The total media area provided within the RPP-WTP radial filter pack shall be such that the maximum media velocity is 6.5 ft/min at the rated flow.
Table FK-4000-1	Type 1 Radial Flow HEPA Filter Nominal Rating: Maximum Resistance of 1.3 in.WC at 2000 acfm maximum rated air flow.	For Type 1 Remote Change HEPA Filter Only: Nominal Rating: Maximum Resistance of 1.55 in.WC at 2000 acfm maximum rated air flow. (Note: Table FK-4000-1 requirements continue to apply as-is to the Type 1 safe change HEPA filter.)

- 3.2.5 Test Aerosol Penetration: ASME AG-1, FK-5120, 0.03% at rated (i.e., maximum) flow rate and 20% of rated flow rate, where rated flow rate is 2,000 acfm.
- 3.2.6 Resistance to Rough Handling: ASME AG-1, FK-5130.
- 3.2.7 Resistance to Pressure: ASME AG-1, FK-5140.
- 3.2.8 Resistance to Heated Air: ASME AG-1, FK-5150.
- 3.2.9 Spot Flame Resistance: ASME AG-1, FK-5160.
- 3.2.10 Supplier performed production inspection and testing shall be in accordance with ASME AG-1, Subarticles FK-5500 and FK-5600.

Note: All production-testing results are subject to validation through FTF quality assurance testing.

3.3 Design Conditions

- 3.3.1 Anticipated filter service conditions are included on the associated HEPA Filter Data Sheet (Appendix A).
- 3.3.2 HEPA filters are not to be used for installations where there is a possibility of condensation forming on them.

3.4 Temperature

Per ASME AG-1, Sub-subarticle FK-1121, filters built to Section FK shall be acceptable for continuous use at a maximum operating temperature of 250°F (121°C). However, extended service under such conditions can cause accelerated aging of organic materials and may subsequently contribute to filter failure. Therefore, when specifying filters subject to operating conditions that may exceed 200°F (93°C) for extended durations, the system engineer shall consult with the responsible engineer for HEPA filter procurement to ensure optimum materials and/or system controls are selected.

3.5 Aging

Note: The maximum life for a HEPA filter specified below is based upon guidance in the DOE Nuclear Air Cleaning Handbook (Reference 2.4.1 section 3.3.8.1).

The maximum total life (storage and in-service) for a HEPA filter is considered to be 10 years from the date of manufacture for applications in dry systems and 5 years in applications where the filter has the potential to become wet (e.g., more than once for short periods). If a filter gets wet, it should be replaced expeditiously.

4 Materials

4.1 Construction

- 4.1.1 Materials of construction for the Safe Change and Remote Change Radial Flow HEPA Filters shall conform to ASME AG-1, Section FK, Article 3000, and applicable portions of the documents listed in Section 2 of this specification.
 - 4.1.1.1 Type 1: ASME AG-1, FK-1121 Type C media pack with urethane adhesive. Reference the Material Requisition 24590-QL-MRA-MKH0-00003 for quantity required. This filter type shall be developed and qualification tested for each type of housing (remote and safe change).
 - 4.1.1.2 Type 3: ASME AG-1, FK-1121 Type C media pack with urethane adhesive. Reference the Material Requisition 24590-QL-MRA-MKH0-00001 for quantity required.
 - 4.1.1.3 Case Material Thickness and Material Type: ASME AG-1, FK-3110: ASTM A240 Type 304 or 304L (annealed) is preferred, however, alternate materials subject to Article FK-3220 requirements and Buyer review may be proposed for use.
 - 4.1.1.4 Grilles: ASME AG-1, FK-3170: ASTM F 1267 Type II Class 3 Expanded Stainless Steel fabricated from Type 304L (annealed) stainless steel sheets as specified in ASTM A666.
 - 4.1.1.5 Gasket Material: ASME AG-1, FK-3122.
 - 4.1.1.6 Media: ASME AG-1, FK-3130 with hydrofluoric acid resistant media formulation (e.g., DN703)

4.1.1.7 Adhesive: ASME AG-1, FK-3150.

4.1.2 Limiting criteria for Remote Change Radial Flow HEPA Filters are shown in Table 1. These criteria may be superceded by Supplier design drawing submittals that have been submitted for Buyer review and permission to proceed. The Supplier design drawings will be used to document the final design.

4.2 Prohibited Materials

4.2.1 For materials in contact with stainless steel, the following shall apply: Low melting point metals (i.e., lead, zinc, tin, antimony, cadmium, mercury) shall not exceed 1% by weight, with mercury not exceeding 50 ppm. Halides shall not exceed 200 ppm. This prohibition applies to use of tools, fixtures, paints, coatings and sealing compounds, and any other equipment or materials used by the Supplier during handling, assembly and storage of stainless steel parts or components.

4.2.2 Asbestos shall not be included in any component of the Safe Change and Remote Change Radial Flow HEPA Filter.

5 Fabrication

5.1 General

5.1.1 Fabrication of the Type 1 Safe Change and Remote Change Radial Flow HEPA Filters shall be as specified in ASME AG-1, Article FK-6000 with the following exceptions.

ASME AG-1 SECTION	SECTION FK CODE REQUIREMENT TEXT	ACCEPTED RPP-WTP REPLACEMENT REQUIREMENT TEXT
FK-6211(a)	“Type 1 filter flange and end cap tolerances shall meet the following criteria: parallel within 1/16 in. (1.6 mm), square to the filter centerline axis to within 1/16 in (1.6 mm) over the total filter length, flat within 1/16 (1.6 mm).”	Type 1 filter flange and end cap tolerances shall meet the following criteria: parallel within 1/8 in., flat within 1/16 in.” Circular runout of inlet flange with respect to outlet end cap shall not exceed 3/32 in.
FK-6212(a)	“Type 1 filter length shall be ± 1/16” (1.6 mm), filter sealing ring diameter ± 1/16” (1.6 mm), sealing face diameter +1/32 in./-0 in. (+0.8 mm/-0 mm), concentricity shall be 1/16 in. (1.6 mm), all other dimensions ± 1/16 (±1.6 mm).”	Type 1 filter length shall be (+0/-1/8 in.), circular runout of filter flange with respect to the filter end cap shall be within 3/32 in., all other dimensions +/- 1/16 in. with exception that design filter media to grille (i.e., faceguard) gap shall be +/- 1/8 in. (i.e., to maintain a minimum media to grille gap of 1/8in.

5.1.2 Fabrication of the Type 3 axial flow circular HEPA filters shall be as specified in ASME AG-1, Article FK-6000 unless otherwise accepted by the Buyer (e.g., Supplier Deviation Disposition Request).

6 Tests and Inspections

6.1 General

- 6.1.1 The test and inspection of Type 1 and Type 3 HEPA Filters shall conform to ASME AG-1, Article FK-5000.
- 6.1.2 The Suppliers test and inspection personnel shall be formally trained to perform assigned duties in accordance with the Suppliers training qualifications program. This program shall be documented and shall be in accordance with recognized standards.
- 6.1.3 Type 1 Safe Change and Remote Change Radial Flow HEPA Filters shall require qualification testing prior to acceptance and production. Filter testing shall be performed and certified by an independent test facility as specified by ASME AG-1, Article FK-5100. Type 3 HEPA filters may be qualified based on the prior qualification of a similar qualified Type 2 circular axial flow filter.
- 6.1.4 Each Type 1 and Type 3 HEPA Filter shall bear the UL-586 label indicating successful testing of these filter types in conformance with UL procedures as required by ASME AG-1.
- 6.1.5 Each Type 1 and Type 3 HEPA Filter manufactured for delivery shall be inspected and production tested in accordance with ASME AG-1, Sections FK-5500 and FK-5600. The results of the production test shall be marked on the label of each filter. Additional attributes to be inspected for Type 1 HEPA Filters are circular runout and parallelism.
- 6.1.6 The Supplier shall provide objective evidence acceptable to the Buyer that the requirements of ASME AG-1 Mandatory Appendix FC-I, Articles I-3000 and I-5000 have been satisfied. Reference AG-1 Mandatory Appendix FC-I-4120.

6.2 Site Tests

Buyer's startup personnel will perform in-place tests after initial installation. Supplier shall provide startup assistance at Buyer's request.

6.3 DOE Filter Test Facility Quality Assurance Testing

- 6.3.1 Uniform Commercial Code (UCC) requirements governing acceptance and disposition of nonconforming goods apply. If during FTF receipt inspection, a filter is identified as damaged and unacceptable for use, the FTF shall contact the buyer and seller (supplier) and inform them of the damage immediately.
- 6.3.2 FTF inspection and testing shall be performed in accordance with DOE-STD-3025-99, Quality Assurance Inspection and Testing of HEPA Filters. As a condition of acceptance, all production filters must successfully pass FTF inspection and testing requirements per sections 6 and 7 of DOE-STD-3025-99. Testing at the DOE FTF of filters fabricated to support design development or qualification is not required unless otherwise requested by the buyer.

- 6.3.3 FTF shall prepare a report to document the test results and apply permanent test labels on the filter case and the filter shipping carton.
- 6.3.4 Accepted and rejected filters shall be marked in accordance with section 8 of DOE-STD-3025-99.
- 6.3.5 If filter(s) fail inspection or testing, the FTF shall notify both the buyer and supplier. The supplier shall be responsible for either replacing failed filter(s), or crediting the buyer, unless other accommodations are agreed upon between the buyer and the supplier.
- 6.3.6 After completion of required inspections and tests, but immediately preceding repackaging of the filter, FTF personnel shall re-inspect the fluid seal (if so equipped) to verify the gelatinous seal was not inadvertently damaged during FTF handling.
- 6.3.7 FTF shall repack accepted filters in a manner comparable to the original packaging received.
- 6.3.8 FTF activities involving packaging, shipping and storage of HEPA filters shall conform to ASME AG-1 Article FK-7000 requirements (i.e., Level B per NQA-1-2004).

7 Preparation for Shipment

7.1 General

- 7.1.1 HEPA Filters shall be packaged, shipped, handled and stored in accordance with ASME AG-1, Article FK-7000, and in accordance with requirements of Reference 2.3.4.

7.2 Filter Marking and Identification

- 7.2.1 Each HEPA Filtershall be identified in accordance with requirements of ASME AG-1, Section FK-9100. The marking and labeling requirements of Reference 2.3.4 are also applicable.
- 7.2.2 Filter nameplates shall be affixed to the filter end cap in the most readily visible location.
- 7.2.3 In addition to the information required by ASME AG-1 FK-9100, filter labeling shall include the following information:
- Date of Penetration Test
 - Purchase Order (PO) Number and PO Line Item Number
 - Procurement Specification Number and Revision
 - FTF Test Label (applied by FTF personnel)
- 7.2.4 Review purchase order to ensure additional filter identification and labeling requirements are not applicable.

7.3 Package Marking and Identification

- 7.3.1 Marking and labeling for each filter carton shall conform to the requirements of ASME AG-1 Subarticle FK-9200.
- 7.3.2 In addition to the information required by ASME AG-1 FK-9200, filter package marking shall include the following information:
- Project Number, Purchase Order (PO) Number and PO Line Item Number
 - Filter Serial Number
 - Procurement Specification Number and Revision
 - FTF Test Label (applied by FTF personnel)
 - Marking or label indicating the need for special storage environment (i.e. "Special Storage Requirements: NQA-1-2004 Level B Storage or equivalent is required.").

7.4 Packaging

- 7.4.1 Packaging shall be in accordance with ASME AG-1, Section FK-7000. The packaging requirements of Reference 2.3.4 are also applicable.

7.5 Documentation

- 7.5.1 Reference Section 10 of this Specification. Shipping documentation shall accurately reflect specific traceability to the items being shipped.

7.6 Shipping and Handling Instructions

- 7.6.1 Shipping and Handling of items shall be in accordance with ASME AG-1, Section FK-7000.
- 7.6.2 Filters shall not be shipped by rail unless prior approval is obtained from the Buyer (Reference 2.4.1 Appendix A.). For large shipments, it is recommended that the entire shipment be shipped in a sealed dedicated trailer. At all times, the filters must be handled with care and oriented properly. Handling requirements (unique to filters) shall be clearly visible on the shipping carton.
- 7.6.3 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.
- 7.6.4 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, airfreight shipments shall also be palletized in accordance with this specification.

- 7.6.5 Arrangements shall be made by the Supplier to ensure filters are shipped directly to the DOE-FTF. Note: Filters fabricated to support design development or qualification are not required to be shipped to the DOE-FTF.
- 7.6.6 The carrier shall be instructed that the buyer's personnel will be responsible for unloading filters at the buyer's receiving facility.
- 7.6.7 The following information, taken from the content of Appendix A of Reference 2.4.1, is provided for those arranging shipment of HEPA filters. It should be considered as guidance information only.

Handling at interchange stations should be controlled to prevent temporary storage in conditions that would subject the filters to dampness, excessive heat or cold or rapidly changing temperatures. Proper attention to orientation of the cartons should be maintained consistent with the filter package instruction. Another control is to require that the filters be packed properly in a sealed truck-trailer body or in a sealed containerized-freight unit, not to be opened until arrival at the specified delivery point. Unloading should be performed by personnel who have been thoroughly instructed in the proper care and handling of HEPA filters. Mixed-load shipments should be avoided.

- 7.6.8 The following information, taken from the content of Appendix A of Reference 2.4.1, is provided for those receiving and unloading HEPA filters. It should be considered as guidance information only.

As the shipment is being unloaded, each carton should be inspected for external damage and improper positioning in the cargo space (i.e., the carton placed with arrow direction horizontally). Damaged cartons, including those with corners dented and those improperly oriented in the truck, should be set aside for particularly careful inspection of their contents. Damage will be more prevalent when filter units are loaded with mixed cargoes or are shipped in a partially loaded carrier. The filter unit must be removed carefully from its carton. The acceptable method for removal is to open the top flaps of the container after removing the sealing tape. With flaps folded back, the carton should be inverted or upended gently to place the exposed end of the filter unit on a flat surface, preferably the floor. The surface must be clear of protrusions. Withdraw the carton from the filter unit. Attempts to remove the filter unit from the carton by grasping below the exposed filter case can result in irreparable damage if fingers puncture the delicate filter materials.

If conflicting handling instructions are provided by the filter manufacturer, the manufacturer's instructions shall prevail.

7.7 Storage

- 7.7.1 HEPA Filters shall be stored in a controlled environment consistent with Level B as identified in ASME AG-1 Article FK-7000 and described in References 2.1.6 and 2.4.1 Appendix A.4.

8 Quality Assurance

8.1 Supplier Quality Assurance Program

- 8.1.1 The supplier shall have in place a Quality Assurance program meeting the requirements of ASME NQA-1-1989 marked as applicable in the Supplier Quality Assurance Program Requirements Data Sheet attached to the Material Requisition. The Supplier shall submit his Quality Assurance Manual with the Supplier's bid documentation.
- 8.1.2 The successful bidder must pass a pre-award survey by the Buyer. Supplier shall demonstrate that their quality program is in compliance with the procurement quality requirements listed in the Supplier Quality Assurance Program Requirements Data Sheet. The Supplier's Quality Assurance Program, reviewed and accepted by the Buyer, shall apply to every sub-tier supplier to the Supplier. The Supplier shall allow Bechtel, its agent, and DOE access to their or any sub-tier supplier's, facility, and records pertaining to the purchase order for the purpose of Quality Assurance Audits and Surveillance at mutually agreed times.
- 8.1.3 All items shall be manufactured in accordance with the Supplier's Quality Assurance program that meets the requirements of ASME NQA-1-1989, and has been previously evaluated and accepted by the Buyer's Quality Assurance Organization.
- 8.1.4 Supplier shall submit their Quality Assurance program and work plan to Buyer for approval and permission to proceed prior to commencement of work. The work plan shall include documents and procedures to implement the work and include a matrix of essential Quality Assurance elements cross referenced with the documents/procedures.

8.2 Quality Assurance Requirements Specific to Item

- 8.2.1 Rejected Filters. The Buyer shall notify the Supplier 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.
- 8.2.2 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 reevaluation of the Supplier's quality assurance program.
- 8.2.3 Qualification Test Evidence. Upon request, the Supplier shall show documented evidence that qualification tests have been conducted in accordance with ASME AG-1 Subarticle FK-5100, FK-5300 and Mandatory Appendix FC-I.
- 8.2.4 Identification of Items with Part Number/Model Number. All filters and filter packages shall be identified with the serial number and model number. Identification shall be in conformance with sections 7.2 and 7.3 of this specification.

Note: The following items are necessary to satisfy Buyer G-321-V Form submittal requirements.

8.2.5 Quality Verification Documents shall be submitted in the form and quantities shown on Form G-321-V, Quality Verification Document Requirements of the procurement package.

8.2.6 Certificate of Conformance (C of C). Each shipment shall be accompanied by one copy of the Supplier's C of C, which meets or exceeds the requirements of ASME AG-1, Subarticle FK-8200. The C of C shall include copies of all filter case material certifications.

The Supplier/Manufacturer shall provide documentation that is legible/reproducible. Supplier's/Manufacturer's authorized representative responsible for quality shall sign the C of C. The C of C shall indicate the appropriate Purchase Order/Contract Order number under which the material, equipment, item or service is being supplied.

8.2.7 Identification of Items with Product Data Sheet. The supplier shall submit a legible copy of the product data sheet (e.g., drawing, catalog page, brochure) that provides adequate information to enable the Buyer to verify the form and function of the article procured. One copy of the documentation, unless otherwise specified, shall accompany the applicable item(s) shipped.

8.2.8 Production Inspection and Test Report. The Supplier shall submit legible, reproducible copies of the production test results and section 6.1 of this specification. The report(s) shall include the following:

- Identification of the applicable inspection and/or test procedure utilized.
- Resulting data for all characteristics evaluated, as required by the governing inspection/test procedure.
- Traceability to the item inspected/tested, (i.e., serial number, part number, etc.).
- Signature of the Supplier's authorized representative or agency that performed the inspections/tests.
- One copy of the documentation, unless otherwise specified, shall accompany the applicable item(s) shipped.

8.2.9 Filter Test Facility (FTF) Inspection and Test Report. A report or data sheet prepared by FTF personnel for each order. Minimum content requirements for this report are contained in Reference 2.2.2. Also, reference section 6.3.3 of this specification.

8.3 Substitutions

8.3.1 Supplier shall be required to identify and promptly document all deviations from the requirements of the procuring documents. In addition, the Supplier shall be required to describe the recommended disposition based on appropriate analysis. Submittals of request for deviations from lower-tier suppliers shall be through the prime supplier to the Buyer.

8.3.2 Supplier-proposed deviations from procurement documents shall be initiated by use of the Supplier Deviation Disposition Request (SDDR) form attached to the Material Requisition.

- 8.3.3 As required in ASME AG-1 Article FK-5100, new or revised filter designs shall require qualification testing prior to acceptance and production. Furthermore, FK-3220 states that other materials found acceptable by the qualification tests of FK-5000, and the design requirements of FK-4000 and Section AA will be acceptable for fabrication of HEPA filters. It is the responsibility of the Supplier to inform the Buyer when Buyer selected designs and/or materials deviate from these two requirements of ASME AG-1.

9 Configuration Management

Each HEPA Filter shall be tagged in accordance with Section 7.2 of this specification.

10 Documentation and Submittals

10.1 General

Supplier shall submit to Buyer Engineering and Quality Verification documents in the forms and quantities shown in Form G-321-E, Engineering Document Requirements, and Form G-321-V, Quality Verification Document Requirements, attached to the Material Requisition.

10.2 Submittals

Submittals for HEPA Filters shall include:

- 10.2.1 Product catalog data sheets with product description, service application, and limitations for all components.
- 10.2.2 Materials of construction for all components.
- 10.2.3 Pressure drop performance curves indicating PRESSURE DROP (Inches WC) versus FLOWRATE (ACFM).
- 10.2.4 HEPA filter maximum allowable pressure drop.
- 10.2.5 Recommended HEPA filter maximum shelf life and basis for this information.
- 10.2.6 Gasket material radiation tolerance.
- 10.2.7 Weight.
- 10.2.8 Filter dimensions.
- 10.2.9 Material Safety Data Sheets.
- 10.2.10 Provide manufacturers Certificate of Conformance covering the ASME, ASTM, or other material specification, grade, class, (as applicable) for each material used in the filter designs..

- 10.2.11 Design Qualification Test Report prepared to support qualification of filter designs in accordance with AG-1 Article FK-5100. Provide a Certificate of Conformance with this test report that summarizes Section FK conformance status of the filter designs. Reference AG-1 Article FK-8200.
- 10.2.12 The Supplier shall provide objective evidence acceptable to the Buyer that the requirements of ASME AG-1 Articles I-3000 and I-5000 have been satisfied. Reference AG-1 Mandatory Appendix FC-I-4120.
- 10.2.13 Copies of the AG-1 FK-5600 Production Test results.
- 10.2.14 Filter Inspection Record and Packaging Certificate to satisfy AG-1 Articles FK-6300 and FK-5500.

10.3 Drawings

- 10.3.1 All drawings shall be submitted as CAD drawings in MicroStation, or MicroStation convertible format.
- 10.3.2 Drawings showing the following information shall be submitted to Buyer for review prior to fabrication:
 - 10.3.3 The outline dimensions of the HEPA Filter, including outline and detail drawings for each component.
 - 10.3.4 Details of construction and fabrication drawings including fabrication tolerances.
 - 10.3.5 The weight of individual components.
 - 10.3.6 The ASTM or equivalent designation for materials.

10.4 Procedures

Procedures to be submitted shall include:

- 10.4.1 Test procedures to support FK-5100 Qualification and FK-5600 Production Testing.
- 10.4.2 Supplier's filter inspection, packaging, and shipping preparation procedure(s) as required to meet the intent of AG-1 Articles FK-5500, FK-6300 and FK-7000.
- 10.4.3 Supplier recommendations (e.g., procedure) for receiving inspection and storage.

10.5 Calculations

Calculations to be submitted shall include:

- 10.5.1 Submit applicable engineering data/calculations/performance charts that demonstrate compliance with this Specification.

10.6 Manuals

Manuals and instructions to be submitted shall include:

10.6.1 Quality Assurance Manual.

10.7 Certificates of Conformance

10.7.1 The Supplier shall provide Certificates of Conformance complying with ASME AG-1 FK-8200. The following clarifications apply:

10.7.1.1 In regard to where conflicts between the Supplier's design and ASME AG-1 Sections FK exist, the Supplier shall identify the respective code articles that do not apply. This may be accomplished by direct reference on the Certificate of Conformance to Buyer accepted submittal drawings and/or Supplier Deviation Disposition Request(s).

10.7.1.2 Copies of all filter case material certifications shall be provided. These certifications shall state all applicable material standards with year or edition to permit compliance assessment with Article FK-2000.

10.7.2 Furnish UL-586 certificate to meet evidence requirement of Article FK-5160.

10.8 Schedules

Lists and schedules shall include schedule of engineering, material purchase, and fabrication. Lists and schedules shall be submitted to the Buyer's Expediter.

10.9 Materials Certificates/Statistics

Reference Section 10.7 of this Specification.

10.10 Data

10.10.1 The Supplier shall provide HEPA Filter performance data sheets and/or design drawings that include the following data.

10.10.1.1 Name of manufacturer, make, model number

10.10.1.2 Media area

10.10.1.3 Pleat depth, pleat length

10.10.1.4 Capacity, initial resistance, temperature rating

10.10.1.5 Dimensions with fabrication tolerances

10.10.1.6 Seal diameter

10.10.1.7 Weight

10.10.1.8 Materials of construction

10.10.1.9 Sealant type

10.10.1.10 Gasket materials

Table 1 Remote Change Radial Flow HEPA Filter Limiting Criteria

Criteria	Basis Statement
The outer diameter (OD) of the filter, inclusive of all design features (e.g. seal channel) and fabrication tolerances shall not exceed 21 inches.	Export of waste filter from facility C5 cave requires use of remote equipment, export basket, and 55 gallon waste container. This process limits the dimensions of the waste item (i.e. filter).
The length of the filter, inclusive of all design features and fabrication tolerances shall not exceed 26-1/2 inches.	The current design of the export basket limits the filter size which may be inserted into the basket. The basket is inserted into a 55 gallon waste container.

Appendix A:

HEPA Filter Data Sheet

24590-WTP-3PS-MKH0-T0002, Rev 3
Nuclear Grade High Efficiency Particulate Air (HEPA)
Filters (ASME AG-1 Section FK Filters)

HEPA FILTER DATA SHEET FOR STANDARD NUCLEAR GRADE HEPA FILTERS (ASME AG-1 SECTION FK COMPLIANT FILTERS)	MR No. 24590-QL-MRA-MKH0-00003	Page 1 of 2
	DATA SHEET No. / Rev. 24590-###-MKD-###-##### / Rev.#	

Quality Level Q (no exceptions)	
Service / Application: <i>Note: Facility, System, Room and PPOE</i> <i>Number required only for filters designated as</i> <i>Dedicated Facility Spare Parts</i> RPP-WTP Facility & System: _____ Facility Rm # (where PPOE is located): _____ PPOE Number: _____	Generic (RPP-WTP) <input type="checkbox"/> Yes Spare Part? <input type="checkbox"/> No Dedicated Facility Spare Part? <input type="checkbox"/> Yes <input type="checkbox"/> No 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 (>200°F) <input type="checkbox"/> Yes <input type="checkbox"/> No
Filter Type (1 or 3 Only): _____ Safe or Remote Change (NA for Type 3): _____ Filter Quantity: _____	
Parent Piece of Equipment (PPOE) Recommended Manufacturer: _____ Recommended Manufacturer's part number: _____ Manufacturer's part number (as furnished): *	

ASME AG-1 Table FK-4000-4 Performance Requirements (Note: Completion of this section not required for Type 3 Safe Change Housing Vacuum Relief Filters)	
Temperature (Max. Continuous Rating is 250°F)	Normal Operating °F (°C): _____ Minimum Operating °F (°C): _____ Maximum Operating °F (°C): _____ Duration for Minimum: _____ and : _____ Maximum Temperatures
Note(s): _____	
Airflow Rate (Type 1 Max. Rating is 2,000 acfm / filter)	Normal Operating: _____ scfm ; _____ acfm Minimum: _____ scfm ; _____ acfm Maximum: _____ scfm ; _____ acfm Temperature and Pressure for Standard Conditions: _____ °F _____ atm
Note(s): _____	
Relative Humidity	Minimum: _____ % Maximum: _____ %
Note(s): _____	
Chemical Exposure (Concentration data for corrosive environments)	Normal operating condition: _____ Upset condition & duration: _____
Note(s): Filter media is glass (boron silicate microfiber formed into paper with an acrylic latex polymer binder) and contains silicone for water repellency. Acid resistance obtained with addition of Nomex®.	
Radiation	Radiological dose level (mrem/hr): _____ Total integrated dose for 10 yr filter life (rads): _____ Radiation Limits: 2.0 x 10 ⁷ rads integrated dose
Note(s): Limit based upon radiation affect on Blu-Jel® sealing properties.	
Biological Exposure	

Ref. 24590-WTP-3PS-MKH0-T0002 Rev. 2

HEPA FILTER DATA SHEET FOR STANDARD NUCLEAR GRADE HEPA FILTERS (ASME AG-1 SECTION FK COMPLIANT FILTERS)	MR No. 24590-QL-MRA-MKH0-00003	Page 2 of 2
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Note(s):
<ul style="list-style-type: none"> • All Filters shall be tested at the DOE Filter Test Facility (FIF) • Filters must be tested per UL 586. Objective evidence shall include a UL-586 label. • FILTERS SHALL BE IN ACCORDANCE WITH SPECIFICATION 24590-WTP-3PS-MKH0-T0002 AND BUYER ACCEPTED SUPPLIER SUBMITTAL DRAWINGS.

Additional Instructions: _____

0		Issued for Purchase				P Sullivan
Rev	Date	Purpose	Originator	Checker	Approver	R.E. Approval

Ref. 24590-WTP-3PS-MKH0-T0002 Rev. 2