

APPENDIX B

RECEIVING INSPECTION DIRECTION AND CHECKLIST

The visual inspection should be performed by a person trained in the design and construction of a high-efficiency particulate air (HEPA) filter.

When visual inspection is made, a strong lamp should be used to examine the exposed areas of both faces to ensure that no breaks, cracks, or pinholes are evident. In addition, a less intense light, such as a flashlight, can be used in a darkened room. The inspector should look for visible defects with the light projected along the full length of each channel created by the separators.

Translucent spots will likely prove to be variations in thickness of the filter medium, which occur during manufacture. Breaks or cracks in the medium usually show up on the surface edges of the filter pleats but often are not readily detected. Minor cracks can be of major importance. If the filter unit is installed with this pleat-edge damage, the cracks can be extended by air movement through the unit. After examining each channel, the inspector should examine the adhesive seal around the filter unit face to be sure that the seal is complete and unbroken. When one face of the filter unit has been inspected, the other face should be examined in the same manner and with the same care.

After the inspector has completed a thorough scrutiny of both faces, he should check the corner joints of the frame for adhesive sealing and tightness. Gasketing about the edge of the frame should be inspected for tight mating of gasket strips and good physical condition. Gasket strips should also be examined for full adhesion to the frame.

Cartons showing damage or dented corners and those that are found loaded in improper position upon delivery and that were set aside after being unloaded from the carrier, require careful inspection. The filter unit should be examined at all corners and particularly at the point of carton impact for damage to separators and medium. Exterior damage to several protruding separator edges in a small area will not influence filter unit efficiency if the medium is not mashed, punctured, or broken. Even though the medium may not be broken on one face, damage may occur at the opposite edge of the pleat on the other face. Large areas of mashed separator edges, even though the medium is not damaged, will obstruct the passage of air through the filter unit and thus reduce its life. Improperly stowed filter units should be inspected particularly for cracks alongside the adhesive seal, for extreme sags in pleats and separators, and for slits or breaks in the medium. The procedures outlined above, including examination with lamp and flashlight, should be used for routine inspections.

Repair of a damaged filter unit, particularly the medium, should not be attempted by the user. Any repaired unit must be retested by DOP penetrometer to ensure that hidden damage does not exist which will reduce filtering efficiency. Repair and retest thus become uneconomical for most users.

Materials used in construction of the filter unit must comply with the purchase specification. Compliance, so far as practicable, should be determined at the time of inspection. Filter units that have been inspected and found damaged, defective, or not in conformance with the purchase order should be separated from acceptable units; identified; and, accompanied by necessary records, referred to the purchasing, receiving, or other appropriate department for proper disposal.

Visual inspection of the filter unit to detect physical damage is necessary. Inspection, however, is not a substitute for DOP testing with a penetrometer. Such testing will readily disclose a defective filter unit, even when faults in the unit cannot be found by visual inspection. High penetration due to faults results in an excessive release of particles to the atmosphere. The penetrometer also measures the pressure drop, or

resistance of the filter unit to the rated airstream. Excessive resistance should not be greater than specified by the purchase order. If not specified, penetration should not exceed 0.03 percent and new resistance should not be more than 1.3 in.wg at rated airflow.

Nuclear-Grade HEPA Filter Inspection Checklist

PURPOSE: This checklist should satisfy the HEPA filter’s compliance with significant portions of DOE-STD-3020, <i>Specifications for HEPA Filters Used by DOE Contractors</i> .		
The inspector should ensure that the following records are on hand for each HEPA filter:		
<ul style="list-style-type: none"> • Vendor Certificates of Conformance • Oak Ridge Filter Test Facility test records (ORFTF) • Shipping records 		
<i>Object of Inspection</i>	<i>Inspection Method</i>	<i>Determination</i>
Packaging	Visual	The filter packaging shows no signs of damage.
	Visual	The filters are packed in individual and durable containers.
	Visual	The filters were crated or palleted.
	Visual	The filter cartons were not stacked more than 3 cartons high.
Filter Construction	Metal ruler	The dimensions of the filter conform to a height of 24 inches by a length of 24 inches (within a tolerance of +0, -1/8 inch [-3 millimeter (mm)] by a depth of 11 1/2 inches (within a tolerance of 1/16 in. [+1.6 mm], -0).
	Metal ruler	The filter face diagonals are within a tolerance of +0, -1/8 inches [-3 mm] total.
	Metal ruler	The width of the filter’s gasket surface is 3/4 in. (19 mm) (within a tolerance of ± 1/16 inches [± 1.6mm]).
	Visual	There are no signs of repaired pinholes or other defects.
	Visual	The separators extend at least 1/8 inch (3 mm) beyond the pleats of the filter medium.
	Visual	The plane formed by the edges of the separators is at least 1/4 inch [6 mm] from the plane of the filter case.
	Square and visual	The pleats are straight. They do not deviate more than 1/2 inch (12 mm) from a line drawn from one end of the pleat to the other end of the pleat.
	Visual	The pleats are perpendicular (~90 degrees) to the top and bottom of the case panels.
Wooden Filter Cases	Visual	The case panels are joined with rabbet joints.
	Certificate of Conformance	The case panels are double nailed or double screwed with coated box nails, corrosion resistant plated screw nails, or flathead wood screws.
	Visual	The end points of the fasteners do not penetrate the inside or outside surfaces of the case.
	Visual	The case faces, edges, and inner surfaces and inner surfaces are thoroughly coated with sealant to minimize permeability.
	Visual	The case face sealant does not reduce the ability of the gasket to adhere to the frame.
	Visual	There are no splinters or rough edges that might penetrate or cut workers’ gloves or injure the fingers of personnel handling the filters.
Metal Filter Cases	Visual	The metal cases have a double-turned 3/4-inch- (19 mm) wide flange on each face, or a fluid-seal socket or sleeve.
	Visual	The case panels have been assembled into a frame by riveting or bolting the corners.
	Certificate of Conformance	The case panels have been assembled into the case by potting a sub-assembly consisting of the filter pack and side panels into the top and bottom panels (but not the corners), using an adhesive meeting the requirements of DOE-STD-3020.

<i>Task</i>	<i>Inspection Tool</i>	<i>Determination</i>
Gaskets [Note: The gaskets can be a one-piece gasket or made up of strips joined at the corners by a keyhole joint, keystone joint, or another interlocking type joint.]	Visual	The gaskets are glued firmly and continuously to the case.
	Visual	The gaskets are not loose, peeling, or distorted.
	Visual	The gasket does not extend more than 1/16 inches (1.6 mm) over either side of the seating surface at any point
	Certificate of Conformance	The edges of the joint area are thoroughly coated with adhesive, meeting requirement of DOE-STD-3020 before assembly.
Faceguards	Visual	The faceguard edges are firmly embedded in adhesive.
	Visual	The faceguards are installed so that projecting wires or edges do not form a puncture hazard to personnel handling the filter.
	Visual	The wires or edges do not project onto or beyond the gasket-mounting surface.
Performance Specifications	Certificate of Conformance	The filter manufacturer has provided objective evidence (hard copy) that the filters meet the following performance requirements.
Penetration	Visual	Aerosol penetration for any HEPA filter will not exceed 0.03 percent (0.0003) for 0.3 μ diameter particles. Note: It is acceptable for the filter manufacturer to perform the aerosol testing with a smaller particulate size aerosol than the standard 0.3 μ m aerosol.
Air Flow Resistance	Visual	Airflow resistance across the HEPA filter will conform to the limits listed in Table 1 of DOE-STD-3020. Tests for resistance to airflow will be conducted at flow rates expressed in actual cubic feet per minute.
Qualification Testing Specifications	Certificate of Conformance	The filter manufacturer will provide objective evidence (hard copy) that the HEPA filters provided meet the test requirements of Sections 6.1.3 to 6.1.5 of DOE-STD-3020.
Resistance to Fire and Heated Air	Visual	Labeling or certification (by Underwriters Laboratory), in accordance with UL-586, will provide evidence of satisfactory compliance with applicable requirements for resistance to fire and heated air.