SAFE CHANGE HEPA FILTER HOUSING Data Sheet No: 24590-LAW-MKD-LVP-00013

MR No. 24590-QL-MRA-MKH0-00001

R10722350

Plant Item No. See description

ISSUED BY RPP-WTP PDC

Rev No. 2 (Note 14)

1	Project:	RPP-WTP	Bldg./Rm #	LAW/L-0304H	Manufacturer:	Flanders/CSC	
2	Project No:	24590	Supporting				
3	Site:	DOE Hanford	Calculations	24590-LAW-MAC-LVP-00007	Manufacturer	*	
4	Safety Class	SS	Associated	24590-LAW-M6-LVP-00001	Part No:		
5	Seismic Category	SC III	Drawings		Quantity Required		5
6	System No.	LVP	System Desc.	24590-LAW-3YD-LOP-00001	Quality Level		Q
7	Description All TYPE-1		Equipment ID #'s:	24590-LAW-LVP-HEPA-00001 A&B, 24590-LAW-LVP-HEPA-00002 A&B &			
8	Melter Offgas 4-Pack HEPA Filter Units			24590-LAW-LVP-HEPA-00003A			

9 DESIGN CONDITIONS

10	Zone Design Temperature- Summer F	95		Maximum/ Normal Inlet Air Temperature F		192 / 158 (Note 8)	
11	Site Storage Conditions - Summer F	101	Dry bulb	67	Wet bulb		
12	Housing Interior Chemical Exposure	Note 7		Environmental Qualification:		Note 12	
13	Site Storage Conditions - Winter F	5		Radiological Dose Level		10 mR / hour (max.)	
14	Indoor Design Temperature - Winter F	66		Radiological Dose Level for Facility Life - 40yrs.		3500 rad (max.)	

15 PERFORMANCE RATING

16	Design Flow Rate (ACFM)	1,600-8,000 (Notes 8,9)	Max. Allowable Leakage (CFM/ Housing)	0.0005 CFM/Cu.Ft. (Note 2)	
17	Maximum Operating Pressure in.WG	(-) 100 (Note 1)	Leak test Pressure (in. WG)	(-) 125	
18	Maximum Design Pressure in WG	(-) 155 (Note 1)	Assembly Clean Pressure Drop with Filters (in. WG)		2.5
19	Total Filter Openings Required	4 (Note 9)	Weight with HEPA Filters (pounds)	Note 4	*
20	No. Filters per Bank (No. wide x No. high)	2x2 (Note 9)	Weight without HEPA Filters (pounds)	Note 4	*

21 CONSTRUCTION

22	Design Housing Manufacturer:	Flanders/CSC	Design Housing Model Number: (Note 9)	*		
23	Housing Construction Method:	All welded				
24	Housing Material:	316L (Note 11)	Housing Material Gauge:			
25	Top Panel Material:	316L (Note 11)	Top Panel Material Gauge:			
26	Structural Frame Material:	316L (Note 11)	Structural Frame Features:			
27	Inlet Plenum Total Volume:		Outlet Plenum Total Volume			
28	Inlet Position: (Top/Side)		Outlet Position: (Top/Side)			
29	Inlet Inside Dimensions: (inches)	18" Diameter	Outlet Inside Dimensions: (inches)	18"	Diameter	
30	Corrosion & Erosion Allowance	0.04"				
31	Inlet Connection Type:		Outlet Connection Type:			
32	Inlet Flange Bolt Required:	Note 6	Outlet Flange Bolts Required:	Note 6		
33	Inlet Flange Bolt Size:	Note 6	Outlet Flange Bolt Size:	Note 6		
34	Inlet Flange Bolt Material:	Stainless Steel	Outlet Flange Bolt Material:	Stainless Steel		
35	Inlet Flange Gasket Material:	1/4" Thk Silicone	Outlet Flange Gasket Material:	1/4" Thk. Silicone		
36	Paint and Finish Material:	N/A	Paint and Finish Material Minimum Thickness:			

37 HOUSING ACCESSORIES

38	Accessory Provided		Accessory Information	
39	Test w/Inlet Isolation Damper:	No	Damper Provided By:	
40			Inlet Isolation Damper Type:	
41			Inlet Isolation Damper Size:	
42	Inlet Transition Ductwork:	Yes	Inlet Transition Ductwork	See sketches for additional
43	Note 9		Overall Length: (inches)	ductwork to be provided.
44			Inlet Transition Smallest	
45			Inside Dimension: (inches)	
46			Inlet Transition Largest	
47			Inside Dimension: (inches)	
48	Inlet Aerosol Test Port Criteria:	Yes	Challenge Aerosol Connection Type:	
49	Design to include inlet aerosol injection manifold.		Challenge Aerosol Connection Size:	
50	Note 9		Challenge Aerosol Connection Quantity:	
51				
52				

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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MR No.	
24590-QL-MRA-MKH0-00001	
Plant Item No.	Rev No.
See description	2 (Note 14)

1	Project:	RPP-WTP	Bldg./Rm #	LAW/L-0304H	Manufacturer:	Flanders/CSC	
2	Project No:	24590	Supporting Calculations	24590-LAW-MAC-LVP-00007			
3	Site:	DOE Hanford			Manufacturer Part No:	*	
4	Safety Class	SS	Associated Drawings	24590-LAW-M6-LVP-00001			
5	Seismic Category	SC III			Quantity Required	5	
6	System No.	LVP	System Desc.	Melter Offgas	Quality Level	Q	
7	Description All TYPE-1		Equipment ID #'s:	24590-LAW-LVP-HEPA-00001 A&B, 24590-LAW-LVP-HEPA-00002 A&B &			
8	Melter Offgas 4-Pack HEPA Filter Units			24590-LAW-LVP-HEPA-00003A			

9 HOUSING ACCESSORIES (continued)

10	Inlet Viewing Ports:		No	Total Number of Viewing Ports Required:		
11				Inlet Viewing Port Type:		
12				Inlet Viewing Port Locations:		
13				Inlet Viewing Port Dimensions: (inches)		Width
14						Length
15	Internal Fire Suppression:		No	Fire Suppression System Description:		
16	Vacuum-Relief Valve w/HEPA Filter	Yes		Number Required:	1 per housing	
17	Size for maximum operation pressure of (-) 22 in.wg.,i.e.,			Vacuum-Relief Vent Assembly Setpoint:		
18	use typical 4-Pack vacuum relief system for this design.			Vacuum-Relief Vent Assembly Manufacturer:		
19	Source: CCN 069001			Vacuum-Relief Vent Model Number:		
20	Test w/Outlet Isolation Damper:		No	Damper Provided By:		
21				Outlet Isolation Damper Type:		
22				Outlet Isolation Damper Size:		
23	Outlet Transition Ductwork:	Yes		Outlet Transition Ductwork Overall Length: (inches)	See sketches for additional ductwork to be provided.	
24	Note 9					
25				Outlet Transition Smallest Inside Dimension:(inches)		
26						
27				Outlet Transition Largest Inside Dimension: (inches)		
28						
29	Outlet Aerosol Test Port Criteria:	Yes		Challenge Aerosol Connection Type:		
30	Sample manifold: 1 upstream & 1 downstream			Challenge Aerosol Connection Size:		
31	Note 9			Challenge Aerosol Connection Quantity:	1	
32	Outlet Viewing Ports:		No	Total Number of Viewing Ports Required:		
33				Outlet Viewing Port Type:		
34				Outlet Viewing Port Locations:		
35				Outlet Viewing Port Dimensions: (inches)		Width
36						Length
37	Differential Pressure Taps:	Yes		Differential Pressure Tap Size: (inches)	1/2" NPT female (Note 10)	
38	Drain Connection:	Yes		Drain Connection Size: (inches)	3/4" minimum	
39	Drain Connection Valve:	Yes		Drain Connection Valve Size: (inches)	3/4" min.	
40				Safe Change Bag Type:	*	

41 UTILITY REQUIREMENTS

42	Electrical: (volts/phase/hertz)		
43	Compressed Air:		
44	Intrumentation Taps:		
45			
46			
47			
48			
49			
50			
51			

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See description	2 (Note 14)

1	Project:	RPP-WTP	Bldg./Rm #	LAW/L-0304H	Manufacturer:	Flanders/CSC	
2	Project No:	24590	Supporting Calculations	24590-LAW-MAC-LVP-00007			
3	Site:	DOE Hanford			Manufacturer Part No:	*	
4	Safety Class	SS	Associated Drawings	24590-LAW-M6-LVP-00001			
5	Seismic Category	SC III			Quantity Required		5
6	System No.	LVP	System Desc.	Melter Offgas	Quality Level		Q
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8	Melter Offgas 4-Pack HEPA Filter Units			24590-LAW-LVP-HEPA-00003A			

Asterisk (*) indicates data to be provided by supplier. Data fields left blank are not required to be filled in.

NOTES:

Reference 24590-WTP-3PS-MKH0-T0001 for applicable housing specification.

1. Max. Design Pressure includes 10% margin on exhauster design total static pressure, ref. calculation 24590-LAW-MAC-LVP-00007 Rev. B Structural Capability Pressure: (-)195" W.G. (includes 25% factor on max. design pressure)

2. Leakage Criteria: Per ASME AG-1, Non-mandatory Appendix SA-B Table B-1310, HEPA housings are leakage Class I ESF. Supplier shop testing leak acceptance criteria shall be a maximum 0.0005 cfm per cu.ft of pressure boundary. Source: ASTM C 852-93 (R1997) Standard Guide for Design Criteria for Plutonium Gloveboxes

3. Limiting Dimensions: As shown on data sheet sketches. Actual construction dimensions are depicted on vendor drawings. Refer to Flanders/CSC Drawing No.*..... for as-built information.

4. Weight: Include weight of housing transitions and ductwork provided by Flanders.

5. Installation Location: Equipment to be located in LAW facility 48 ft. elevation. LAB building height is 68 ft.

6. Fasteners: F/CSC to provide fasteners (I.e., bolts, nuts, washers) for all F/CSC-to-F/CSC flanged connections. All others provided by Buyer.

7. The following are constituents of the off-gas (lb/hr): total air mass flow = 13,000 lb/hr

Organic matter 0.12	Hg 0.0018	HF 0.079	SO2 0.26
Water vapor 952	CO2 321	NO 47	I2 0.00165
CO 2.4	HCl 0.024	NO2 82.3	NH3 0.056

Source: 24590-LAW-MKC-LVP-00005 Rev. A (committed) Sht 7

8. Nominal Flow Rate: 3,500 ACFM. Flow data from calculation 24590-LAW-MKC-LVP-00005 Rev. A, (committed) (two melters operating) Temperature data from calculation 24590-LAW-MEC-LVP-00003 Rev. 0 (Committed) Sht 10

9. Testable 4-Pack housing configuration is desired, complete with duct transitions and test sections (similar to RPF-2H2W-K-304L-TITO) such that overall foot print dimensions and test manifold qualifications are maintained. (Note: Test manifold qualification are documented in supplier submittal # 24590-QL-POA-MKH0-00001-10-02 Rev.00A). In addition, provide elbow and square-to-round transition duct sections shown in attached data sheet sketches.

10. Differential Pressure Tap: Size hole penetrating housing pressure boundary at 1/8" diameter. (CCN 141792)

11. Low carbon content alloy steel, "L" designated material, i.e., 316L, shall be used for pressure boundary materials (exposed to the offgas stream) that will be welded. 316 or 304/304L SST may be substitued for items such as fasteners that will not be exposed to the offgas stream. Alternate materials may be proposed and accepted by the Buyer using the design submittal process.

12. Environmental Qualification: None. Basis: Housing materials have been selected which will allow this component to serve its intended safety function for the anticipated service life. The materials are all corrosion resistant stainless steel with the exception of silicone used for gaskets. Silicone is capable of serving its function given the dilute offgas chemical concentrations, normal, abnormal and accident temperature, and low radiation environment anticipated for this system.

SAFE CHANGE HEPA FILTER HOUSING Data Sheet No: 24590-LAW-MKD-LVP-00013	MR No. **24590-QL-MRA-MKH0-00001**	
	Plant Item No. **See description**	Rev No. **2** (Note 14)

NOTES: (CONTINUED)

13. This item is Dangerous Waste Permit (DWP) affecting.

14. Rev. 2 of this data sheet is a complete revision. Due to extensive changes, change bars are not shown. Changes include addition of qualification criteria, addition of other notes to clarify design and testing requirements, and added 2 duct elbows and 2 duct transition pieces to scope of work.

QUALIFICATION CRITERIA (Ref. IEEE Std. 323-1983)

Interfaces: The loading at the ductwork inlet and outlet connections is provided in the table below.
The housing will be anchored in the facility using ASTM F1554-04 grade 36, 3/4" diameter bolts. Ref. 24590-WTP-3PS-FB01-T0001
The table below shows the design load requirements for forces and moments applied to piping nozzles at the BNI-F/CSC interface point.

Load Case	F_A(lbs)	F_B (lbs)	F_C (lbs)	M_A (ft-lbs)	M_B (ft-lbs)	M_C (ft-lbs)
Weight	700	700	700	1200	800	800
Thermal	2000	700	2100	2800	3900	1000
Seismic	4000	900	2800	4200	4600	1900

The directions of the listed forces and moments are based on the following convention:
A axis = Axial to HEPA nozzle interface w/ BNI piping
B axis = Vertical
C axis = Lateral based on the Right Hand Rule
The loads and moments provided are to be taken in both the positive and negative orientations, as specific signs are not included.
Source for load data stated above: CCN 139983

Service Conditions: Normal and Abnormal Service Condtions: Design pressure, temperature, and radiation environmental conditions as stated on Page 1.

Safety Function: Second stage of HEPA filtration is relied on to remove ammonium nitrate aerosols from the offgas stream to prevent deposition of ammonium nitrate in the downstream mercury abatement carbon beds. The second (final) bank of HEPA filters must have a particle collection efficiency of greater than or equal to 99.95% when tested in-situ.

The housing design must ensure that the pressure boundary withstands design basis events including an SC-III seismic event, without losing confinement. The safety analysis relies on the housing and associated duct/piping pressure boundary to prevent exposure of the facility worker to nitrogen oxide (NOx) gases.

Seismic Functional Test Acceptance Criteria (inclusive of Margin) Required to Ensure Safety Function: Each housing shall be testable and capable of exhibiting greater than or equal to 99.97% efficiency when tested in accordance with ASME AG-1 TA-4634 and Mandatory Appendix TA-VI. F/CSC test procedure to confirm leakage of pressure boundary is 0.0005 cfm/cu.ft. or less prior to and following seismic functional testing.

Qualified Life Objective: The housing is to serve its safety function for a minimum 40-year life. Supplier shall identify any periodic surveillance/maintenance, test and replacement/refurbishment recommendations within the Suppliers Operations and Maintenance manual as necessary to meet this objective.

Submergence: N/A
Chemical Spray: NA
SAFETY SCREENING/EVALUATION REQUIRED? ☒ YES ☐ NO

Rev	Date	Issue for	Originator	Checker	E&NS	Approver
2	10/10/06	Purchase. (Note 14)	P. Sullivan / S. Kretzschmar	N. Johnson	M. Medsker	
1	7/11/2005	Purchase	Sid Sourani	Mac Sanvictores	xxx	Sean Sweeney
0	4/21/2005	Purchase	Sid Sourani	Mac Sanvictores	xxx	Sean Sweeney

	SAFE CHANGE HEPA FILTER HOUSING Data Sheet No: 24590-LAW-MKD-LVP-00013	MR No. 24590-QL-MRA-MKH0-00001	
		Plant Item No. See description	Rev No. 2 (Note 14)

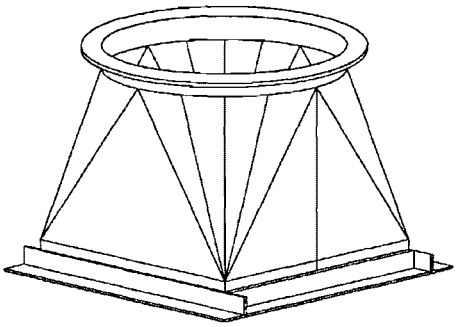
SQUARE-TO-ROUND TRANSITION PIECE (PROVIDE 2-PER HOUSING, i.e., INLET / OUTLET)

Flange-to-Flange Height = 12"

Round flange to be ASME B16.5, WN, A182 Gr. F316L, CL 150, STD WT, STD F, NPS 18, RF flange.

Square Flange to be bolted companion angle, 24" x 24", drilled to match elbow flange shown below.

Note: This transition piece will be placed in horizontal configuration, w/ square end attached to elbow (shown below), round end will transition to BNI supplied pipe.



SQUARE ELBOW WITH TURNING VANES (PROVIDE 2-PER HOUSING, i.e., INLET / OUTLET)

Note: This elbow will be installed at inlet & outlet of 4-Pack housing configuration (which includes duct transitons and test sections).