

 River Protection Project Waste Treatment Plant	HLW Catalytic Oxidizer/Reducer		Data Sheet No.	Rev.
	Mechanical Data Sheet		24590-HLW-MKD-HOP-P0020	0
Sheet 1 of 4			Component No.	
			24590-HLW-MB-HOP-SCO-00003	
Project	RPP-WTP	System Description	Thermal Catalytic Oxidizer/Selective Catalytic Reduction	
Project No.	24590			
System No	HOP	Reference Doc	Specification 24590-WTP-3PS-MBTV-TP001	
Building	HLW		PDS 24590-HLW-MKD-HOP-00003	
Quality Level	2	Associated Dwgs	24590-HLW-M5-V17T-P20004	
Seismic Criteria	Category III		24590-HLW-M6-HOP-P20008	

PROCESS DATA (Buyer)

Offgas Inlet Conditions:				Primary Offgas Inlet Composition:			
	Normal	Maximum	Design		Nominal	Maximum	
Vol. Flow (acfm)	2250	3062	2000 scfm	N ₂ (By Volume)	69.9%	65.8%	
Temperature (°F)	330	330	(note 1)	O ₂ (By Volume)	18.7%	17.6%	
Pressure (in. wg)	-32.4	-50.9	± 80	H ₂ O (By Volume)	10.1%	14.9%	
Allowable Diff. Pressure (in. wg)			10	CO ₂ (By Volume)	0.36%	0.55%	
				Ar (By Volume)	0.84%	0.79%	
				NO _x (note 2) (lb/hr)	4.4	26	
				CO (lb/hr)	0.25	0.50	
				SO ₂ (g/hr)	0.30	0.25	
				Hg (g/hr)	4.6E-04	2.4E-02	
				HCl (g/hr)	1.4E-05	9.8E-05	
				HF (g/hr)	4.4E-04	4.2E-03	
				I ₂ (g/hr)	7.4E-11	5.4E-08	
				Total of As, Cr, Cu, Fe, Ni, Pb, Sb, Si, Sn, Zn (g/hr)	1.6E-11	1.1E-10	
				Organics (lb/hr)	<0.5	0 to 4	

Process Data Notes

- Design Temperature for the Thermal Catalytic Oxidizer/Selective Catalytic Reduction internals and vessel shall be determined by the Seller based on the thermodynamic activities in the equipment
- Minimum NO_x concentration ranges to 0 lb/hr.

Ammonia Supply.

	Normal	Maximum
Temperature (°F)	77	125
Specific Gravity (vapor) (lb/lb air SC)	6.00	12.8
Viscosity (μP)	100	137
Internal Pressure (psia)	145	314
Solids Content (wt.%)	0%	0%

Note: Buyer will supply anhydrous ammonia at Seller's specified flowrate to meet design conditions. Seller is responsible for flow control of anhydrous ammonia to meet performance requirements. Ammonia vaporizer assure nominal conditions.

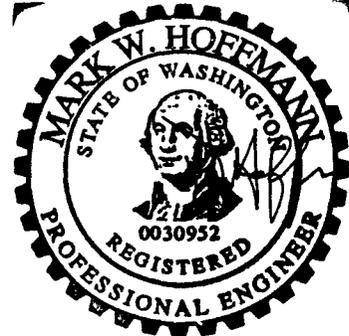
Performance Requirements:

- The destruction removal efficiency (DRE) for volatile organic compounds (VOCs) and semi-volatile compounds (SVOCs) shall be greater than or equal to 95%. The Principal Organic Dangerous Constituents (PODCs) to be used in HLW performance testing are naphthalene (CAS 91-20-3) and 2-propene-1-ol (CAS 107-18-6). A DRE greater than 95% is preferred.
- The NO_x Selective Catalytic Reduction (SCR) unit shall perform with a reduction efficiency of 95%.
- Dioxin and furan emissions at the outlet of the Thermal Catalytic Oxidizer/Reducers shall meet the MACT criteria of 0.2 ng/m³ TEQ (Toxic Equivalent).

Note: 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 the 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.

Contents of this document are Dangerous Waste Permit affecting

This Bound Document Contains a total of 4 sheets



9/29/04

EXPIRES 12/10/04

0	Issued for Permitting Use	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	9/29/04
Rev	Reason for revision	By	Check	Review	Approved

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RPP-WTP PDC

HLW Catalytic Oxidizer/Reducer

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MECHANICAL DATA (Buyer)

Construction Data:

Process Equipment Dimensions (L x W x H):		Ammonia Dilution Equipment (L x W x H)	
Sections	12.5 x 5 x 6 ft	Skid dimensions with dilution fans	7.5' x 5' x 4.5' ft
Overall	25 x 5 x 10 ft	Skid dimensions without dilution fans	5' x 3' x 4.5' ft
Operating Weight	_____ lbf	Operating Weight	2000 lbf
Shipping Dimensions (L x W x H)	_____ ft	Shipping Dimensions (L x W x H)	7.5' x 5' x 4.5' ft
Shipping Weight	_____ lbf	Shipping Weight	2000 lbf

Thermal Analysis Data:

Room Temperature	_____ 83 °F	Concrete Slab Base Thickness	_____ 6 Ft
Earth Temperature Under Base	_____ 70 °F	Thermal Conductivity of Concrete Slab	K = _____ 1.8 W / m / K
Maximum Heat Loss	_____ 15 Kw		

Thermal Cycling Frequency: For design purposes, use a thermal cycle frequency of once every two (2) months for the life of the plant (40 years).

Process Pipe and Housing Fabrication Data:

Pipe Class	S11V	Housing Material	316 L SS
Pipe Material	316 L SS	Rating	ASME B16.5
Flange Material	316 L SS	Inlet Piping Size	14 inches
Flange Rating	CL 150 RF B16.5	Outlet Piping Size	16 inches
Gasket Material	316 SS Spiral-Wound / B16.20		

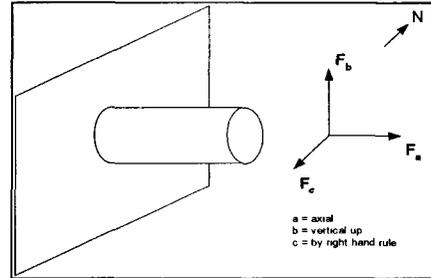
Ammonia Piping:

Pipe Class	S30J	Rating	ASME B16.5
Pipe Material	304 L SS	Inlet Piping Size	TBD inches
Flange Material	304 L SS	Valve Material	316/316 L SS
Flange Rating	CL 300 RF B16.5	Valve Trim	TRIM 12, API 600
Gasket Material	316 SS Spiral-Wound / Graphite Filled		

Nozzle Loadings (Buyer)

Inlet:

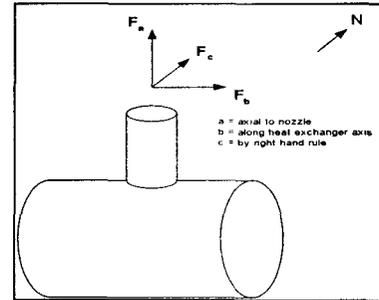
Load Case	Fa (lb)	Fb (lb)	Fc (lb)	Ma (ft-lb)	Mb (ft-lb)	Mc (ft-lb)
Weight	400	-500	400	1000	3000	-1000
Thermal (+)	200	1000	200	2000	2000	2000
Thermal (-)	-4400	-1000	-1000	-7000	-15000	-25000
Seismic (+)	3500	3500	3500	11000	18000	18000
Seismic (-)	-3500	-3500	-3500	-11000	-18000	-18000
Normal (+)	600	500	600	3000	5000	1000
Normal (-)	-4000	-1500	-600	-6000	-12000	-26000
Occasional (+)	4100	4000	4100	14000	23000	19000
Occasional (-)	-7500	-5000	-4100	-17000	-30000	-44000



Nozzle movements at °F: $\Delta a = ______ , \Delta b = ______ , \text{ and } \Delta c = ______ \text{ (nominal)}$
 $\Delta a = ______ , \Delta b = ______ , \text{ and } \Delta c = ______ \text{ (design)}$

Outlet:

Load Case	Fa (lb)	Fb (lb)	Fc (lb)	Ma (ft-lb)	Mb (ft-lb)	Mc (ft-lb)
Weight	-1700	400	400	-200	-500	500
Thermal (+)	2000	1000	2000	100	13000	1000
Thermal (-)	-1300	-2000	-2000	-20000	-2000	-16000
Seismic (+)	4200	6600	6600	9500	75000	75000
Seismic (-)	-4200	-6600	-6600	-9500	-75000	-75000
Normal (+)	300	1400	2400	800	12500	1500
Normal (-)	-3000	-1600	-1600	-20200	-2500	-15500
Occasional (+)	4500	8000	9000	10300	87500	76500
Occasional (-)	-7200	-8200	-8200	-29700	-77500	-90500



Nozzle movements at °F: $\Delta a = ______ , \Delta b = ______ , \text{ and } \Delta c = ______ \text{ (nominal)}$
 $\Delta a = ______ , \Delta b = ______ , \text{ and } \Delta c = ______ \text{ (design)}$

- Notes: 1 Normal = Weight + Thermal
 2 Occasional = Weight + Thermal + Seismic

HLW Catalytic Oxidizer/Reducer			
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SYSTEM PERFORMANCE (Seller)			
Volatile Organic DRE	95 %	Semi-Volatile Organic DRE	95 %
NO _x Reduction	95 %	Ammonia consumption, max	10 lb/hr
NO _x emissions, max	58 ppm @ 7% O ₂	Ammonia entering injection chamber	Dilution Air:
Ammonia slip, max	20 ppm @ 7% O ₂	Pressure	1.0 in-WG Pressure 1.0 in-WG
Ammonia/NO _x molar injection ratio	0.95	Flow	9.3 lb/hr (max) Flow 200 scfm
Pressure drop through Oxidizer unit	10 in wg	Temperature	100 °F
Minimum service life of catalyst:	VOC 2 yrs (EST.)	NO _x	2 yrs (EST.)
Recommended Catalyst replacement schedule	Test at 1 year to determine activity level. Replacement schedule could be 2-4 year intervals. Δ		
COMPONENTS (Seller)			
Catalyst	Organic	NO _x	
Manufacturer	Engelhard (VOCAT 360 PFC)	Haldor Topsoe	
Number of reactors	9	50	
Residence time, sec	0.15	1.20	
Arrangement	2 blocks x 4.5	3.5 high x 3 wide	
Catalyst vol. per reactor ft ³	7	76.62	
Type	Precious metal - platinum	Vanadium/Titanium	
Material base/substrate	ceramic - cordierite	ceramic - honeycomb	
Number of layers per reactor	2	5	
Thickness of layer, in	4.3	10.0	
Spacing between layer, in	0.125	0.125	
Space for additional layer, in	8.5	none	
Is dummy layer provided	Yes	No	
Flow passage, in x in.	0.066" x 0.066"	0.125" x 0.125"	
Face velocity thru reactor, fpm	486	292	
Max allowable temp, °F	1300	1100	
Min allowable temp, °F	700	550	
Module Dimensions, (L x W x D)	12.5" x 12.5" x 8.5"	18" x 18" x 10"	
Module weight, lb	40	45	
Total weight per reactor, lb	360	2425	
Housing			
Material/Thickness, in	3/8" plate 316L SS	3/8" plate 316L SS	
Number of Section	2	1	
Weight of Heaviest Section, lb	30,000	20,000	
Insulation Lining	Ceramic fiber block	Ceramic fiber block	
Material/Thickness, in	7" thick 8 lbs density	7" thick 8 lbs density	
Thermal Cond, Btu-in/hr ft ² °F	40 btu-in/hr ft ² °F	40 btu-in/hr ft ² °F	
Method of Attachment	Weld stud w/ your attachmt	Weld stud w/ your attachmt	
Design pressure, psig	3.5	3.5	
Operating pressure, psig	15	15	
Design temperature, °F	1300	1300	
Ducting			
Material/Thickness, in	3/8" plate 316L SS	3/8" plate 316L SS	
Cross Section, ft x ft	3' tall x 2' wide	3' tall x 2' wide	
Duct Velocity, fpm	700	700	
Electric Heater			
Manufacturer	Watlow		
Type	Round Tubular Elements - Watrod		
Number of Heat Zone	57 heating elements		
Watt Density, W/in ²	12		
Power, kW	155		
Voltage/Current rating	480V / 186.5 amps		

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Recuperative Heat Exchanger			
Manufacturer	Exothermic Eclipse		
Type	Plate type		
Material	316L SS		
Ht transfer coefficient, Btu/hr ft ² °F	5.76		
Heat exchange area, ft ²	2,179		
ΔT (LMTD)	194		
Heat Exchanger duty, Btu/hr	2,439,000		
Ammonia Injection Manifold			
Type/Arrangement	Spider		
Feed Inlet Dia. in	1/2" dia.		
Supply Pressure/Temp (psi/°F)	1 psig @ 100%		
Material/Quantity	316L SS		
No. of nozzle bar per manifold	6 nozzles		
No. of nozzles per bar	6		
Spacing between nozzles, in	3.5"		
Nozzle opening diameter, in	0.5"		
Weight			
Shipping (Heaviest), lb	30,000 lbs	15,000 lbs	
Installed, lb	30,000 lbs	15,000 lbs	
Shipping dimension (L x W x H), in	12.5' x 5' x 6'	12 5' x 5' x 6'	
Notes			
NOTES			
1	Deleted		
2	Deleted		
3	Seller's data is rounded and based on preliminary engineering design.		
4	Sub component tag numbers:		
	24590-HLW-HOP-HX-00003		
	24590-HLW-HOP-HTR-00007		
	24590-HLW-HOP-SCO-00004		
	24590-HLW-HOP-SCR-00002		