

# Technical Memorandum

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**To:** Elizabeth Trythall, Air Quality Division  
North Dakota Department of Environmental Quality

**From:** Sherwin Wanner, PE  
Houston Engineering, Inc.

**Subject:** City of West Fargo – Air Curtain Incinerator

**Date:** December 12, 2023

**Project:** TO #8 (HEI Project 8654-0008)

## INTRODUCTION

The City of West Fargo Department of Sanitation and Recycling operates the West Fargo Inert Landfill (the Facility) which is an inert landfill permitted by the North Dakota Department of Environmental Quality (NDDEQ); permit number 0184. The Facility is located at 806 26<sup>th</sup> Street Northwest, West Fargo, ND in Cass County.

The facility is planning to install an air burner, also known as an air curtain incinerator, for clean wood waste which will consist of tree branches, brush and leaves, and pallets. The City of West Fargo requests authorization from the NDDEQ to operate the air curtain incinerator at the facility.

## UNIT DESCRIPTION

The Model 5-330 Self-Contained Refractory Walled Air Curtain Burner is manufactured by Air Burners, Inc. This model has a four-cylinder 74.5 hp diesel engine; HATZ Model 4H50TIC. The engine is certified to EPA Tier 4 Final emissions requirements and does not require diesel exhaust fluid injection to meet the requirements. The design of the air burner does allow it to be relocated, however, to support the current facility it is expected to remain in a single location for more than 12 months at a time. Therefore, for the request, the incinerator box and the engine are considered stationary and the stationary engine requirements require air permitting.

The air curtain incinerator firebox will be fed wood waste and ignited. Once the fire is established the air curtain fan will be turned on. The air curtain reduces the emissions by trapping most of the smoke particles and causes them to re-burn under the air curtain where the temperatures may exceed 1,800 degrees Fahrenheit. The air curtain does not inject any fuel into the fire. The fire is sustained only by adding more wood waste. The only fuel used in the continuous operation is that of the diesel engine driven fan. The fan generates a curtain of air with the mass flow and velocity necessary to act as a trap over the top of the thermo-ceramic lined firebox. An ash clean-out rake attached to a standard piece of equipment is used periodically to remove the ash from the firebox for proper disposal.

## WOOD WASTE VOLUMES

The beginning volume of wood waste to be processed in the unit by the facility is anticipated to be 100 tons per month with 75% of that being tree and brush material and 25% of it being clean wood pallet material. The beginning operating time will be approximately 12 hours per month at 11-13 tons per hour. It is expected that the volume of wood waste will increase in the future. The factors for increasing volume are general community growth, industry growth of wood pallet material, and an anticipated increase in tree waste from the impacts of the Emerald Ash Borer. In 2023 the Emerald Ash Borer was detected in Moorhead, Minnesota and it is expected that impacts will eventually spread to West Fargo. The City of West Fargo does have an Emerald Ash Borer plan, <https://www.westfargond.gov/DocumentCenter/View/3862/Emerald-Ash-Borer--City-of-West-Fargo-Plan?bidId=>, that implements strategies and ordinances to manage the tree removal and replacement over a manageable period.

## EMISSION CALCULATIONS

Maximum emissions at equipment capacity for the air curtain incinerator have been calculated and are included as Attachment 2 to the General Form SFN8516. A summary of the calculated emissions is shown in Table 1 below. Emissions have been included for both the air curtain incinerator box and the diesel engine for the fan unit. The emission factors are based on manufacture supplied test data, United States Forest Service testing data, and published AP-42 emission factors, as documented in the emission calculations. The Table 1 emission rates assume continuous operation at the equipment capacity. Actual emissions are expected to be significantly lower than the values in Table 1.

While operating the air curtain incinerator the EPA Method 9 – Visual Opacity Determination will be used to determine compliance with the opacity limitation on an annual basis. The Method 9 tests include three periods of one-hour each. Initial opacity testing for the air curtain incinerator is due within 180 days of initial startup.

**Table 1: Emission Summary**

Emission Summary						
Facility	City of West Fargo, Department of Sanitation and Recycling					
Source	Air Curtain Incinerator					
Emission Source ID	EU 1					
Tons per Year	tpy					
	Air Curtain Incinerator		HATZ Engine		Total	
Pollutant	Potential Annual Emission Rate (tpy)	Estimated Beginning Rate (tpy)	Potential Annual Emission Rate (tpy)	Estimated Beginning Rate (tpy)	Potential Annual Emission Rate (tpy)	Estimated Beginning Rate (tpy)
PM, PM <sub>2.5</sub> , and PM <sub>10</sub>	57.82	0.66	0.71	0.01	58.53	0.67
NO <sub>x</sub>	52.56	0.60	10.07	0.11	62.63	0.71
SO <sub>x</sub>	5.26	0.06	0.66	0.01	5.92	0.07
NMHC	57.82	0.66			57.82	0.66
CO	136.66	1.56	2.17	0.02	138.83	1.58
CO <sub>2</sub>	190,056.96	2,169.60	372.44	4.25	190,429.40	2,173.85
CH <sub>4</sub>	73.58	0.84	0.0151	0.0002	73.60	0.84
N <sub>2</sub> O (Based on 0.013 lb/MN)	7.35	0.08	0.003	0	7.35	0.08
VOC	47.30	0.54	0.82	0.01	48.12	0.55
CO <sub>2e</sub>	190,137.89	2,170.52	372.4581	4.2502	190,510.35	2,174.77
Largest Single HAP			0.0027	0.0000	0.0027	0.0000
HAP Total			0.009	0.0001	0.009	0.000

## ATTACHMENTS

Included as attachments with this request to operate the proposed air curtain incinerator are the following documents:

- NDDEQ Form SFN8516 – Permit Application for Air Contaminant Sources
- NDDEQ Form SFN8522 – Permit Application for Incinerators/Crematories
- NDDEQ Form SFN8891 – Permit Application for Internal Combustion Engines and Turbines
- Attachment 1 – Site Plan with Proposed Air Curtain Location
- Attachment 2 – Air Curtain Incinerator and Engine Emission Calculations
- Attachment 3 – Air Curtain Incinerator and Engine Manufacturer Data
- Attachment 4 – Manufacturer Estimated Emission Calculation Reports
- Attachment 5 – Air Curtain Emissions Study from the USDA Forest Service, Rocky Mountain Research Station)

**Process Material Classification Chart  
CLASSIFICATION OF MATERIALS TO BE INCINERATED**

Classification Type and Description	Principal Components	Approximate Composition % By Weight	Moisture Content %	Incombustible Solids %	Btu Value/Lb of Refuse As Fired	Btu of Auxiliary Fuel Per Pound of Material to be Included in Combustion Calculations	Recommended Minimum Btu/Hr Burner Input Per Pound of Material
*0 Trash	Highly combustible waste, paper, wood, cardboard cartons, including up to 10% treated papers, plastic or rubber scraps; commercial and industrial source.	Trash – 100%	10%	5%	8500	0	0
*1 Rubbish	Combustible waste, paper, cartons, rags, wood scraps, combustible floor sweepings; domestic, commercial, and industrial sources.	Rubbish – 80% Garbage – 20%	25%	10%	6500	0	0
*2 Refuse	Rubbish and garbage; residential sources	Rubbish – 50% Garbage – 50%	50%	7%	4300	0	1500
*3 Garbage	Animal and vegetable wastes, restaurants, hotels, markets; institutional, commercial, and club sources.	Garbage – 65% Rubbish – 35%	70%	5%	2500	1500	3000
4 Animal Solids and Organic Wastes	Human remains, carcasses, organs, solid organic wastes; hospital, laboratory, abattoirs, animal pounds, and similar sources.	Animal and Human Tissue – 100%	85%	5%	1000	3000	8000 5000 Primary 3000 Secondary
5 Gaseous Liquid or Semi-Liquid Wastes	Industrial process wastes.	Variable	Dependent Upon Predominant Components	Variable According to Wastes Survey	Variable According to Wastes Survey	Variable According to Wastes Survey	Variable According to Wastes Survey
6 Semi-Solid and Solid Wastes	Combustibles requiring hearth, retort, or grate burning equipment.	Variable	Dependent Upon Predominant Components	Variable According to Wastes Survey	Variable According to Wastes Survey	Variable According to Wastes Survey	Variable According to Wastes Survey

\* The above figures on moisture content, ash, and Btu as fired have been determined by analysis of many samples. They are recommended for use in computing heat release, burning rate, velocity, and other details of incinerator designs. Any design based on these calculations can accommodate minor variations.



# PERMIT APPLICATION FOR INTERNAL COMBUSTION ENGINES AND TURBINES

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY  
DIVISION OF AIR QUALITY  
SFN 8891 (9-2021)

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS FORM.  
- Must include SFN 8516 or SFN 52858

## SECTION A – GENERAL INFORMATION

Name of Firm or Organization City of West Fargo	Facility Name West Fargo Inert Landfill
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## SECTION B – FACILITY AND UNIT INFORMATION

Source ID Number (From form SFN 8516) EU 1		
Type of Unit (check all that apply)	<input type="checkbox"/> Stationary Natural Gas-Fired Engine	<input type="checkbox"/> Emergency Use Only
	<input checked="" type="checkbox"/> Stationary Diesel and Dual Fuel Engine	<input checked="" type="checkbox"/> Non-Emergency Use
	<input type="checkbox"/> Stationary Gasoline Engine	<input type="checkbox"/> Peaking
	<input type="checkbox"/> Stationary Natural Gas-Fired Turbine	<input type="checkbox"/> Demand Response
	<input type="checkbox"/> Other – Specify:	

## SECTION C – MANUFACTURER DATA

Make HATZ Diesel	Model 4H50TIC	Date of Manufacture	
Reciprocating Internal Combustion Engine			
<input type="checkbox"/> Spark Ignition	<input checked="" type="checkbox"/> Compression Ignition	<input type="checkbox"/> Lean Burn	<input type="checkbox"/> Rich Burn
<input checked="" type="checkbox"/> 4 Stroke	<input type="checkbox"/> 2 Stroke		
Maximum Rating (BHP @ rpm) 74 HP @ 2800 rpm	Operating Capacity (BHP @ rpm) 66 HP @ 2600 rpm		
Engine Subject to:			
<input checked="" type="checkbox"/> 40 CFR 60, Subpart IIII			
<input type="checkbox"/> 40 CFR 60, Subpart JJJJ			
<input checked="" type="checkbox"/> 40 CFR 63, Subpart ZZZZ			
<input type="checkbox"/> 40 CFR 60, Subpart OOOO (for compressors)			
<input type="checkbox"/> 40 CFR 60, Subpart OOOOa (for compressors)			
Turbine			
Dry Low Emissions? <input type="checkbox"/> Yes <input type="checkbox"/> No			
Heat Input (MMBtu/hr)	Maximum Rating (HP)	75% Rating (HP)	Efficiency
Turbine Subject to:			
<input type="checkbox"/> 40 CFR 60, Subpart GG <input type="checkbox"/> 40 CFR 60, Subpart KKKK			

## SECTION D – FUELS USED

Natural Gas (10 <sup>6</sup> cu ft/year)	Percent Sulfur	Percent H <sub>2</sub> S
Oil (gal/year) 300 @ 100 days/yr to 6,240 @ 260 days/yr (assume 3.0 gal/hr)	Percent Sulfur 0.0015% (weight)	Grade No. #2 Low Sulfur Deisel
LP Gas (gal/year)	Other – Specify:	

## SECTION E – NORMAL OPERATING SCHEDULE

Hours Per Day 8	Days Per Week 5	Weeks Per Year 52	Hours Per Year 100 (beginning) to 2,080	Peak Production Season (if any) Summer
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## SECTION F – STACK PARAMETERS

Emission Point ID Number EU 1	Stack Height Above Ground Level (feet) 1.7 (estimated)		
Stack Diameter (feet at top) 0.17 (estimated)	Gas Discharged (SCFM) 138 (ACFM) (estimated)	Exit Temp (°F) 600-700 (estimated)	Gas Velocity (FPS) 100 (estimated)

**SECTION G – EMISSION CONTROL EQUIPMENT**

Is any emission control equipment installed on this unit?  
 No       Yes – Complete and attach form SFN 8532

**SECTION H – MAXIMUM AIR CONTAMINANTS EMITTED**

Pollutant	Maximum Pounds Per Hour	Amount (Tons Per Year)	Basis of Estimate*
NO <sub>x</sub>	2.3	10.07	AP-42 Table 3.3-1 and MPCA Internal combustion engines air emission calculator
CO	0.49	2.17	AP-42 Table 3.3-1 and MPCA Internal combustion engines air emission calculator
PM	0.16	0.71	AP-42 Table 3.3-1 and MPCA Internal combustion engines air emission calculator
PM <sub>10</sub> (filterable and condensable)	0.16	0.71	AP-42 Table 3.3-1 and MPCA Internal combustion engines air emission calculator
PM <sub>2.5</sub> (filterable and condensable)	0.16	0.71	AP-42 Table 3.3-1 and MPCA Internal combustion engines air emission calculator
SO <sub>2</sub>	0.15	0.66	AP-42 Table 3.3-1 and MPCA Internal combustion engines air emission calculator
VOC	0.19	0.82	AP-42 Table 3.3-1 and MPCA Internal combustion engines air emission calculator
GHG (as CO <sub>2e</sub> )	85.04	373.7	AP-42 Table 3.3-1 and MPCA Internal combustion engines air emission calculator
Largest Single HAP	0.0006	0.0027	AP-42 Table 3.3-1 and MPCA Internal combustion engines air emission calculator
Total HAPS	0.0021	0.009	AP-42 Table 3.3-1 and MPCA Internal combustion engines air emission calculator

\* If performance test results are available for the unit, submit a copy of test with this application, if manufacture data used, submit manufacturers specification sheets.

IS THIS UNIT IN COMPLIANCE WITH ALL APPLICABLE AIR POLLUTION RULES AND REGULATIONS?  
 YES       NO

If "NO" a Compliance Schedule (SFN 61008) must be completed and attached.

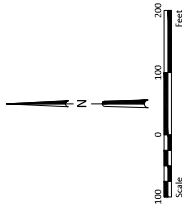
Attach and label separate sheet(s) if you need more space to explain any system or answers or to provide complete listings of Emissions, Contaminants, or other items.

**SEND COMPLETED APPLICATION AND ALL ATTACHMENTS TO:**

North Dakota Department of Environmental Quality  
 Division of Air Quality  
 4201 Normandy Street, 2<sup>nd</sup> Floor  
 Bismarck, ND 58503-1324  
 (701) 328-5188



# SITE PLAN WITH PROPOSED AIR CURTAIN LOCATION



ATTACHMENT #1  
PROJECT NO. 8654-0008  
SHEET  
1 of 1

AIR QUALITY PERMIT FOR AIR CURTAIN INCINERATOR  
CITY OF WEST FARGO  
WEST FARGO, ND

Date 12-6-23  
Drawn by JP  
Checked by SW  
Scale AS SHOWN



No.	Revision	Date	By

HEI NO. 8654-0008





# AIR CURTAIN INCINERATOR AND ENGINE EMISSION CALCULATIONS

**Air Curtain Incinerator Emission Calculations**

Facility City of West Fargo, Department of Sanitation and Recycling  
 Source Air Curtain Incinerator  
 Emission Source ID EU 1

**Equipment Capacity:**

Model No.	S-330			
Rated Capacity	11-13	tons/hour		
Average Capacity	12	tons/hour		
Maximum Annual Throughput	105,120	ton/year	24,000	lb/hr
Maximum Hours of Operation	8,760	Hours/yr		
Heat Value of Wood	5,375	Btu/lb		Reference AP-42 1.6.1
Rated Heat Capacity	129,000,000	Btu/HR	129	MMBtu/hr

**Anticipated Beginning Operation:**

Hourly Throughput	12	ton/hour			
Hours of Operation	6	Daily	8-12	Monthly	100
Average Tonnage of Wood Waste	72	Daily	100	Monthly	1,200

Pollutant

Pollutant	Emission Factor (lb/ton) <sup>1</sup>	Potential Emission Rate (lb/hr)	Potential Annual Emission Rate (lb/yr)	Potential Annual Emission Rate (tpy)	Estimated Beginning Emission Rate (lb/hr)	Estimated Beginning Emission Rate (lb/yr)	Estimated Beginning Rate (tpy)
PM, PM <sub>2.5</sub> , and PM <sub>10</sub>	1.10	13.20	115,632	57.82	13.2	1,320.0	0.66
NO <sub>x</sub>	1.00	12.00	105,120	52.56	12.0	1,200.0	0.60
SO <sub>x</sub>	0.10	1.20	10,512	5.26	1.2	120.0	0.06
NMHC	1.10	13.20	115,632	57.82	13.2	1,320.0	0.66
CO	2.60	31.20	273,312	136.66	31.2	3,120.0	1.56
CO <sub>2</sub>	3,616	43,392.00	380,113,920	190,056.96	43,392.0	4,339,200.0	2,169.60
CH <sub>4</sub>	1.40	16.80	147,168	73.58	16.8	1,680.0	0.84
N <sub>2</sub> O (Based on 0.013 lb/MMBtu)	0.14	1.68	14,696	7.35	1.7	167.8	0.08
VOC	0.90	10.80	94,608	47.30	10.8	1,080.0	0.54
CO <sub>2e</sub>	3,617.54	43,410.48	380,275,783.78	190,137.89	43,410.48	4,341,047.76	2,170.52

1. Emissions Factor's provided by Manufacturer in document "Regulating Air Curtain Burners", Manufacturer spreadsheet document "S300 Generic 7.4 (21 Spt 2021) Report, and/or AP-42 Emission Factor Document (Supplement G) July 2001

**Air Curtain Incinerator Emission Calculations**

Facility City of West Fargo, Department of Sanitation and Recycling  
 Source Air Curtain Incinerator  
 Emission Source ID EU 1

**Equipment Capacities**

Model No.	S-330		
Rated Capacity	11-13	tons/hour	
Average Capacity	12	tons/hour	
Maximum Annual Throughput	105,120	ton/year	24,000 lb/hr
Maximun Hours of Operation	8,760	Hours	

**Estimated Heat Value of Material**

	<u>Wet wood</u>	<u>Dry wood</u>	
Reference AP-42 1.6.1	4,500	8,000	Btu/pound
Rated Heat Capacity @ Average Equipment Capacity	108,000,000	192,000,000	Btu/Hr

**Anticipate Operation**

Wet Wood Portion by weight	75	%	
Dry Wood Portion by weight	25	%	
Heat Value of Wood	5,375	Btu/lb	
Average Rated Heat Capacity	129,000,000	Btu/HR	129 MMBtu/hr

Emission Summary

Facility City of West Fargo, Department of Sanitation and Recycling  
 Source Air Curtain Incinerator  
 Emission Source ID EU 1

Pollutant	Air Curtain Incinerator		HATZ Engine		Total	
	Potential Annual Emission Rate (tpy)	Estimated Beginning Rate (tpy)	Potential Annual Emission Rate (tpy)	Estimated Beginning Rate (tpy)	Potential Annual Emission Rate (tpy)	Estimated Beginning Rate (tpy)
PM, PM <sub>2.5</sub> , and PM <sub>10</sub>	57.82	0.66	0.71	0.01	58.53	0.67
NO <sub>x</sub>	52.56	0.60	10.07	0.11	62.63	0.71
SO <sub>x</sub>	5.26	0.06	0.66	0.01	5.92	0.07
NMHC	57.82	0.66			57.82	0.66
CO	136.66	1.56	2.17	0.02	138.83	1.58
CO <sub>2</sub>	190,056.96	2,169.60	372.44	4.25	190,429.40	2,173.85
CH <sub>4</sub>	73.58	0.84	0.0151	0.0002	73.60	0.84
N <sub>2</sub> O (Based on 0.013 lb/MMBtu)	7.35	0.08	0.003	0	7.35	0.08
VOC	47.30	0.54	0.82	0.01	48.12	0.55
CO <sub>2e</sub>	190,137.89	2,170.52	372.4581	4.2502	190,510.35	2,174.77
Largest Single HAP			0.0027	0.0000	0.0027	0.0000
HAP Total			0.009	0.0001	0.009	0.000

### Air emissions from internal combustion engines

For each engine, complete one engine tab and include all information in the blue boxes.

Engine designation	Air Curtain Incinerator	Date of manufacture	TBD
Make	HATZ	Date installed	2024 at the site
Model	4H50TIC	Displacement	1,952 liters/cylinder
Electrical output	N/A kW	Diesel engine tier	Tier 4 if known

Does this engine operate to do any of the following? Select yes or no for each. Go to the 'FAQs' tab for more information.

No	Supply power to electric grid in emergency situations (emergency demand response)
No	Supply power to electric grid in non-emergency situations (peak shaving)
No	Other financial arrangement

Does a federal rule apply to this engine?

No	Need help? Use EPA's Regulation Navigation tools for assistance. Go to the 'Federal standards' tab for more information.
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#### Calculate the potential and actual air emissions from this engine

Engine and fuel type	Reciprocating - diesel	
Engine use	Routine	
Rated mechanical output	74,5	Horsepower(HP) or Brake Power (HP-hr)
Number of hours operated per 12 months	100	hours per year (hr/yr)
Brake specific fuel consumption	7000	(Btu/HP-hr)
Heat value of fuel	138000	(Btu/gal)
Sulfur content of the fuel	NA	%

#### Internal combustion engine potential and actual emissions

Pollutant	a GWP <sup>1</sup>	b Engine Rated Output (MMBtu/hr)	c Actual Annual Throughput (MMBtu/yr)	d Potential Annual Hours <sup>3</sup> (hr/yr)	e Emission Factor (lbs/MMBtu) by pollutant	Emission Rate lb/hr by pollutant	Potential Emissions	Actual Emissions
							(b * d * e) / 2000 (ton/yr)	(c * e) / 2000 (tons/yr)
see engine emission factors tab								
Criteria Air Pollutants								
PM		0.5215	52.15	8760	0.3100	0.1617	0.71	0.01
PM10					0.3100	0.1617	0.71	0.01
PM2.5					0.3100	0.1617	0.71	0.01
SOx					0.2900	0.1512	0.66	0.01
NOx					4.4100	2.2998	10.07	0.11
VOC					0.3600	0.1877	0.82	0.01
CO					0.9500	0.4954	2.17	0.02
Lead					n/a		0.00	0.00

#### Greenhouse Gas Emissions

Source: 40 CFR 98, Subp. C, Table C-1 and C-2								
Greenhouse Gas								
CO <sub>2</sub> <sup>2</sup>	1				163,0540	85,0327	372.44	4.25
CH <sub>4</sub> <sup>2</sup>	25				0.0066	0.0034	0.0151	0.0002
N <sub>2</sub> O <sup>2</sup>	298				0.0013	0.0007	0.0030	0.0000
GHG total (CO <sub>2</sub> e) <sup>2</sup>						85,0368	373.72	4.27


#### Hazardous Air Pollutants

see engine emission factors tab								
Hazardous Air Pollutant								
1,1,2,2-tetrachloroethane							0.0000	0.0000
1,1,2-trichloroethane							0.0000	0.0000
1,3-butadiene					0.0000	0.0000	0.0001	0.0000
1,3-dichloropropene							0.0000	0.0000
Acetaldehyde					0.0008	0.0004	0.0018	0.0000
Acrolein					0.0001	0.0000	0.0002	0.0000
Benzene					0.0009	0.0005	0.0021	0.0000
Biphenyl							0.0000	0.0000
Carbon tetrachloride							0.0000	0.0000
Chlorobenzene							0.0000	0.0000
Chloroform							0.0000	0.0000
Ethylbenzene							0.0000	0.0000
Ethylene dibromide							0.0000	0.0000
Formaldehyde					0.0012	0.0006	0.0027	0.0000
Hexane							0.0000	0.0000
Methanol							0.0000	0.0000
Methylene chloride							0.0000	0.0000
Naphthalene					0.0001	0.0000	0.0002	0.0000
PAH					0.0002	0.0001	0.0004	0.0000
Phenol							0.0000	0.0000
Styrene							0.0000	0.0000
Tetrachloroethane							0.0000	0.0000
Toluene					0.0004	0.0002	0.0009	0.0000
Vinyl chloride							0.0000	0.0000
Xylene					0.0003	0.0001	0.0007	0.0000
HAP total						0.0021	0.0090	0.0001

<sup>1</sup> Global Warming Potential from 40 CFR Part 98, Subpart A, Table A-1

<sup>2</sup> CO<sub>2</sub>e = carbon dioxide equivalents

<sup>3</sup> Routine = 24 hr/day \* 365 day/yr or 8760 hr/yr; Emergency = 500 hr/yr for purposes of calculating potential air emission to identify whether or not a permit is required.



# MANUFACTURER ESTIMATED EMISSION CALCULATIONS REPORTS

EQUIPMENT		OPERATION
Model	Throughput t/hr	hr/day
S 330	12	23

REFERENCE FACTORS FROM SVI CALIFORNIA  
(Max. Allowed EF)

PM10 lbs./t	Nox lbs./t	Sox lbs./t	CO lbs./t	VOC lbs./t
1.30	1.00	0.10	2.60	0.90

The Emissions Factors above are the San Joaquin Valley, California, established thresholds for the FireBox Series 300 used there as an accepted baseline. They are easily achievable by all ACI designs of Air Burners, Inc. and the actual emissions are considerably lower.

PROJECTED EMISSIONS  
Emissions in lbs. per hr of Wood Waste

PM10 lbs./hr	NOx lbs./hr	SOx lbs./hr	CO lbs./hr	VOC lbs./hr
15.60	12.00	1.20	31.20	10.80

PROJECTED EMISSIONS  
Emissions Released in lbs. per Day

PM10 lbs./d	NOx lbs./d	SOx lbs./d	CO lbs./d	VOC lbs./d
358.80	276.00	27.60	717.60	248.40

PROJECTED EMISSIONS \*  
Emissions Released in Tons per Year

PM10 t/yr	NOx t/yr	SOx t/yr	CO t/yr	VOC t/yr
65.48	50.37	5.04	130.96	45.33

\*Year = 365 Work Days

Use ratio 50/50 for PM10 ; PM2.5 if needed

Cells with green background are variables.

NOTE: The emissions data in the chart is only applicable to the air curtain burner designs of Air Burners, Inc. Contact Factory for data on other Air Burners models, i.e. S220. Subject to Change without Notice.

Engine Emissions  
g / kW-hr

NOx	PM10	CO	VOC	HP
4.47	0.03	5.00	0.24	74.5

Engine Emissions  
g per day

NOx	PM10	CO	VOC	HP
12.58	0.08	14.08	0.6620	74.5

Engine Emissions  
tons per year\*

NOx	PM10	CO	VOC	HP
2.30	0.02	2.57	0.1208	74.5

Overall Total Projected Emissions per Day  
lbs. per day

NOx	PM10	CO	SOx	HP
288.578	358.885	731.685	249.062	27.600

Overall Total Projected Emissions per Year\*  
tons per year

NOx	PM10	CO	SOx	HP
52.665	65.496	133.532	45.454	5.037

Total Annual Feedstock (tons)  
100,740

NOTE: Nox to VOC split per BAAQMD NOx is 95% of the sum of NMHC + Nox



4330 SW Cargo Way, Palm City, FL 34990  
© 2021, Air Burners, Inc.

VERs. 7.4 (14 SEP 2021)  
300 SERIES

CRITERIA POLLUTANTS FOR AIR CURTAIN BURNERS  
FireBox Emissions Factors  
(Combustion Process + Diesel Engine Emissions)  
Feedstock: Wood Waste (Clean/Untreated)

Prepared for

City of West Fargo  
Air Curtain Incinerator  
Clean Wood and Clear Wood Pallets

Model S 330

Model	Equipment	Throughput t/hr	Operation hr/day
S 330	Diesel Engine Tier 4 HATZ 4H50	12	6

REFERENCE FACTORS FROM SVI CALIFORNIA (Max. Allowed EF)			
PM10 lbs./t	Nox lbs./t	CO lbs./t	VOC lbs./t
1.30	1.00	0.10	2.60
15.60	12.00	1.20	31.20
10.80	10.80	10.80	10.80

The Emissions Factors above are the San Joaquin Valley, California, established thresholds for the FireBox Series 300 used there as an accepted baseline. They are easily achievable by all ACI designs of Air Burners, Inc. and the actual emissions are considerably lower.

PROJECTED EMISSIONS Emissions in lbs. per hr of Wood Waste			
PM10 lbs./hr	NOx lbs./hr	SOx lbs./hr	CO lbs./hr
15.60	12.00	1.20	31.20
10.80	10.80	10.80	10.80

PROJECTED EMISSIONS Emissions Released in lbs. per Day			
PM10 lbs./d	NOx lbs./d	SOx lbs./d	CO lbs./d
93.60	72.00	7.20	187.20
64.80	64.80	64.80	64.80

PROJECTED EMISSIONS * Emissions Released in Tons per Year			
PM10 t/yr	NOx t/yr	SOx t/yr	CO t/yr
0.80	0.61	0.06	1.59
0.55	0.55	0.55	0.55

\*Year = 17 Work Days

Use ratio 50/50 for PM10 : PM2.5 if needed

Engine Emissions g / kW-hr			
NOx	PM10	CO	VOC
4.47	0.03	5.00	0.24
74.5	74.5	74.5	74.5

Engine Emissions lbs. per day			
NOx	PM10	CO	VOC
3.28	0.02	3.67	0.1727
74.5	74.5	74.5	74.5

Engine Emissions tons per year*			
NOx	PM10	CO	VOC
0.03	0.00	0.03	0.0015
74.5	74.5	74.5	74.5

Overall Total Projected Emissions per Day lbs. per day			
NOx	PM10	CO	SOx
75.281	93.622	190.874	64.973
74.5	74.5	74.5	74.5

Overall Total Projected Emissions per Year*			
NOx	PM10	CO	SOx
0.640	0.796	1.622	0.552
0.061	0.061	0.061	0.061

Engine Emissions g / hp-hr			
NOx	PM10	CO	VOC
3.3296	0.0224	3.7285	0.1752
74.5	74.5	74.5	74.5

Engine Emissions g per day			
NOx	PM10	CO	VOC
1,488.31	10.00	1,666.64	78.33
74.5	74.5	74.5	74.5

NOTE: Nox to VOC split per BAAQMD NOx is 95% of the sum of NMHC + Nox

Total Annual Feedstock (tons)  
1,224

VERs. 7.4 (14 SEP 2021)-300 SERIES

Cells with green background are variables.

NOTE: The emissions data in the chart is only applicable to the air curtain burner designs of Air Burners, Inc. Contact Factory for data on other Air Burners models, i.e. S220. Subject to Change without Notice.





# AIR CURTAIN INCINERATOR AND ENGINE MANUFACTURER DATA

## FIREBOX SPECIFICATIONS



**General:** A self-contained, completely assembled above ground Air Curtain Burner (air curtain incinerator or FireBox) with a refractory lined burn-container for stationary and mobile applications. Designed for the high temperature reduction of wood waste in forestry, agriculture, land clearing, at landfills, transfer stations and other waste streams in compliance with the requirements of US EPA 40CFR60.

Shipped from the factory completely assembled ready for immediate use and does not require disassembly for relocation. The FireBox is also used for disaster recovery and Department of Homeland Security contingencies. Electrically powered version (S330E) available for permanent (stationary) installations.

1	Power	Four-cylinder Turbo Diesel Engine approx. 74.5 HP, HATZ Model 4H50TIC (Does not require DEF) or equivalent engine; Emissions certified US EPA Tier 4 FINAL; Engine mounted PTO	
2	Burn Container (FireBox)	4" (102 mm) thick refractory wall panels filled with proprietary thermal ceramic material; Two full height refractory rear doors; Three ignition holes; FireBox open to the ground	
3	Safety Systems	Engine over temperature shut down; Loss of cooling fluid shutdown; Loss of oil pressure shutdown; Front deck security enclosure	
4	Instrument Panel	MBW electronic engine control with preset throttle settings: key switch, tachometer, hour meter, fuel gauge, oil pressure and water temperature and safety shutdown features	
5	Air Supply	Custom heavy duty fan	
6	Fuel Tank	110 Gallon (416 L) minimum fuel tank capacity	
7	Transportation & Set-up	Shipped completely assembled; Ready for immediate use; Lifting pads provided for crane lifting	
8	Options	Ash clean-out rake with 1" (25 mm) blank steel faceplate, interface to accommodate loader to be attached by end-user	
9	Average Through-put	11-13 Tons per Hour (Average – See Note)	
10	Fuel Consumption	Approx. 3.0 gal/hr. (11.4 L/hr.)	
11	Weight	59,000 lbs. (26,760 kg)	
12	Dimensions	Overall Size L x W x H	Fire Box L x W x H
		40' 4" x 11' 10" x 9' 6" (12.3 m x 3.6 m x 2.9 m)	30' 2" x 8' 5" x 8' 1" (9.2 m x 2.6 m x 2.5 m)

**Note:**

Achievable through-put depends on several variables, especially the nature of the waste material, the burn chamber temperature and the loading rate.

All weights and dimensions are approximate and metric conversions are rounded. Specifications are subject to change without notice.

**AIR BURNERS, INC.**

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## **REGULATING AIR CURTAIN BURNERS**

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### **INTRODUCTION**

This brochure is intended to provide guidance and insight to the purpose, the benefits and the regulations concerning Air Curtain Burners.

Air Curtain Burners, also known as Air Curtain Incinerators are machines designed as an environmentally friendly alternative to open burning or grinding of wood and other vegetative waste. Air Burners, Inc. are the originators and the leading manufacturers of air curtain machines. This brochure will give you a brief overview of the principles behind the Air Curtain machine and it will provide guidance to more in-depth information regarding the environmental benefits of these machines, official testing results and the Federal regulations governing the use of these machines.

The first question you might ask; why should I be interested in Air Curtain Burners? As most environmentally concerned people know, Black Carbon is one of the most significant components of climate change. Most of the scientific community now consider Black Carbon the number two concern behind CO<sub>2</sub> (see [www.StopBlackCarbon.com](http://www.StopBlackCarbon.com) for more detailed information). Black Carbon has risen in attention not only because of its effect in the atmosphere, but also because of all the climate change contributors, Black Carbon is the one we can correct the quickest. Compared to CO<sub>2</sub> with an atmospheric life of 100 years, Black Carbon's life span seldom exceeds 5 years. Air Curtain Burners are the only machines available today that were designed specifically to eliminate Black Carbon.

The common process of grinding wood and other vegetative waste is one of the worst contributors to climate change with large releases of both non-biogenic CO<sub>2</sub> and Black Carbon both from the large engines and from the grinding process. (see [www.WoodWasteBurners.com](http://www.WoodWasteBurners.com) for an environmental comparison of grinding vs. Air Curtain Burners) Grinding is a "process" it is not an "end solution." Open burning, landfill and Air Curtain Burners are end solutions, and Air Curtain Burners have the lowest impact on the environment.

If you are considering regulations for your state, county and/or town regarding Air Curtain Burners we would suggest you consider two levels of permitting: 1) Temporary and 2) Stationary.

1. Temporary Use - As an alternative to open burning and to encourage a move away from open burning, allow permits under a similar system as was used for open burning. This generally means a local permit easily and quickly obtained from a local authority such as the fire department or the forestry department. Typical applications would be for land clearing, forest fuels reduction, pipeline clearing, roads and parks cleanup, invasive species removal, etc. Typically these machines would not be allowed to operate at a location for more than 6 months.

#### **AIR BURNERS, INC.**

## **REGULATING AIR CURTAIN BURNERS**

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2. Stationary Use - These applications would include county landfill, parks, transfer stations, industrial sites, etc. These applications would require Title V permitting through the State air quality office. The Code of Federal Regulations provides for a simplified system to allow an abbreviated Title V permit for these applications as Air Curtain Burners are exempt from all performance requirements except opacity (EPA method 9). The combustion of clean vegetative waste is considered carbon neutral, therefore the concern in permitting a stationary unit should be 1) Particulate release and 2) local effects or impacts.

Air Curtain Burners are a well proven technology that when implemented can significantly reduce your Black Carbon and provide you a means to reduce open burning. They are also the most cost effective “end solution” for wood and vegetative waste. In these times of difficult municipal budgets, communities can benefit by reducing their load on the local landfills and at the same time take one more step forward in the battle on climate change. The following sections will provide you more details on the machines and the federal regulations. You can find addition resources at [www.AirBurners.com](http://www.AirBurners.com) or by calling our offices.

### **PRINCIPLE OF OPERATION**

Air Curtain Burners were designed principally as a pollution control device. The primary objective of an air



curtain machine is to reduce the particulate matter (PM) or smoke, that results from burning clean wood waste. It is sometimes hard to visualize with- out seeing a machine in operation (see video at: [www.AirBurners.com](http://www.AirBurners.com)), but the machines do not burn anything, rather they control the results of something burning. You could look at it as a pollution control device for open burning. Clean wood waste is loaded into the FireBox, an accelerant like diesel is poured onto the wood and the pile is ignited. Once the fire is ignited the vegetative waste burns naturally, no additional fuels are used. Very similar to starting a campfire. The air curtain is not fully-engaged until the fire has grown in strength or the air curtain may blow the fire out. Once the fire has reached suitable strength, usually in 15 to 20 minutes, the air curtain is engaged. The air curtain then runs at steady-state throughout the burning operations and the waste wood is loaded at a rate consistent with the rate of burn.

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#### **AIR BURNERS, INC.**

## REGULATING AIR CURTAIN BURNERS

### Principle

The purpose of the air curtain is to stall or slow down the smoke particles on their way out of the FireBox. In doing this the particles (PM) are subjected to the highest temperatures in the FireBox. Stalling the smoke particles in this region just under the air curtain causes them to re-burn, further reducing their size to an acceptable limit. The result is a very clean burn with opacities well under 10% (as compared to open burning which typically can run at 80% to 100% opacity).

### Operation

You can see in the picture to the right two standard Air Burners FireBoxes completely full and burning while in the background a pile of wood is open burned. This is a photograph taken by BC Hydro in Canada at one of their hydro-electric dams during the first test of the Air Burners machines. The wood is regularly removed from the water intakes.

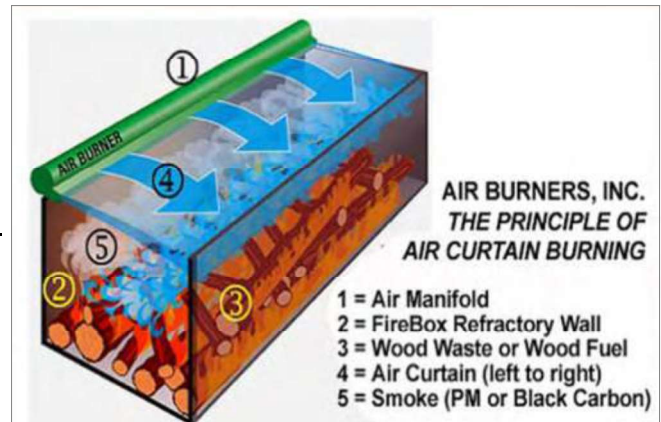
The wood pile that is open burning continued to burn for several days. That open burning pile could have been eliminated with the FireBox in less than 2 hours with significantly less impact on the environment.

### REGULATIONS

Air Curtain Burners are typically regulated in two ways: Under the States authority for control of open burning, by an abbreviated Title V permit in accordance with 40 CFR part 60.

### Alternative to open burning - Temporary site location

Air Curtain Burners are a "tool" to help regulators move away from hazardous practices such as open burning and grinding. They are a sound alternative to open burning and the process of grinding and hauling of wood and vegetative waste. In both cases Air Curtain Burners are significantly better for the environment, and they offer the user a significant reduction in overall cost for waste disposal as well, everyone benefits. (see white paper ACB vs. Grinders by visiting [www.WoodWasteBurner.com](http://www.WoodWasteBurner.com))



## **REGULATING AIR CURTAIN BURNERS**

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The authority to regulate open burning resides with the States, most States familiar with Air Curtain machines permit the use of these machines using the same process as is used to permit open burning. In some areas burning is only allowed if an air curtain machine is used. An applicant would typically apply for their permit at either the local fire department or the local office of the State Forestry Department. In these instances the air curtain machine will be temporarily located at a site for no more than 6 months and must meet the Federal guidelines for air quality as defined in 40 CFR 60.

### **Title V permit - Stationary site location**

If an air curtain machine is to be used at a stationary site then an abbreviated Title V permit is required in accordance with 40 CFR 60. In the Federal regulations Air Curtain Burners burning clean wood and vegetative waste as defined by these regulations are required only to meet the EPA Method 9 type opacity test. The reasoning behind this is twofold; first, the contributions to the atmosphere from the burning of clean wood and vegetative wastes are well known as it is a natural process that is part of the Earth's carbon cycle. As Air curtain machines do not use any supplementary fuels to support combustion then the combustion in an Air Curtain machine is well understood and is considered "carbon neutral." Second, the purpose of an Air Curtain machine is to reduce particulate matter (PM) therefore the most applicable test is a visual opacity test. Air Curtain machines are required to meet a maximum 10 percent opacity reading for steady state operation. This is of course significantly better than any type of open burning which regularly runs 80 to 100 percent opacity. Even whole log grinding operation can't meet the ten percent opacity limits.

### **Typical results for an Air Burners FireBox**

Listed below are typical test results for an Air Burners, Inc. air curtain FireBox. These test results have been generated during various testing programs that include the US EPA, the USDA Forest Service, the US Military and company hired consultants. Some of these test results are available on our website at; [www.AirBurners.com](http://www.AirBurners.com) and we can provide more details upon request. Air Burners is proud to be a CRADA partner with the USEPA. We regularly participate in training and test program with environmental agencies to help create a better understanding of the use and benefit of an Air Curtain Burner from Air Burners.

USDA Forest Service	CO <sub>2</sub>	CO	CH <sub>4</sub>	NMHC	PM <sub>2.5</sub>	CE
lbs per ton of waste burned	(lbs/ton of waste)	(lbs/ton of waste)	(lbs/ton of waste)	(lbs/ton of waste)	(lbs/ton of waste)	%
Air Curtain Burner Test Results	3616	2.6	1.4	1.1	1.1	99

## **REGULATING AIR CURTAIN BURNERS**

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### **Federal Regulations Concerning Air Curtain Incinerators CODE of FEDERAL REGULATIONS (CFR)**

Title 40 – Protection of the Environment Chapter 1 – Environmental protection Sub Chapter C – Air programs  
Part 60 – Standards of performance for new stationary sources Sub Part CCCC (CSWI) and/or Sub part  
EEEE (OSWI).

The following pages will provide some excerpts from 40 CFR 60 Sub Part CCCC (CSWI) Sub part EEEE  
(OSWI)

### **EXCEPTS FROM 40 CFR PART 60**

#### **Sub Part CCCC (CSWI)**

§ 60.2020 What combustion units are exempt from this subpart?

This subpart exempts fifteen types of units described in paragraphs (a) through (o) of this section.

Note: We only included the paragraphs between (a) and (q) that are applicable to Air Curtain Incinerators.

Air curtain incinerators. Air curtain incinerators that burn only the materials listed in paragraphs (i)(1)  
through (3) of this section are only required to meet the requirements under “Air Curtain Incinera-  
tors” (§§ 60.2245 through 60.2260).

100 percent wood waste.

100 percent clean lumber.

100 percent mixture of only wood waste, clean lumber, and/or yard waste.

### **AIR CURTAIN INCINERATORS**

#### **§ 60.2245 What is an air curtain incinerator?**

An air curtain incinerator operates by forcefully projecting a curtain of air across an open chamber or open pit  
in which combustion occurs. Incinerators of this type can be constructed above or below ground and with or  
without refractory walls and floor. (Air curtain incinerators are not to be confused with conventional combus-  
tion devices with enclosed fireboxes and controlled air technology such as mass burn, modular, and fluidized  
bed combustors.)

Air curtain incinerators that burn only the materials listed in paragraphs (b)(1) through (3) of this section are  
only required to meet the requirements under “Air Curtain Incinerators” (§§ 60.2245 through 60.2260).

100 percent wood waste.

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#### **AIR BURNERS, INC.**

## **REGULATING AIR CURTAIN BURNERS**

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100 percent clean lumber.

100 percent mixture of only wood waste, clean lumber, and/or yard waste.

### **§ 60.2250 What are the emission limitations for air curtain incinerators?**

Within 60 days after your air curtain incinerator reaches the charge rate at which it will operate, but no later than 180 days after its initial startup, you must meet the two limitations specified in paragraphs (a)(1) and (2) of this section.

The opacity limitation is 10 percent (6□minute average), except as described in paragraph (a)(2) of this section.

The opacity limitation is 35 percent (6□minute average) during the startup period that is within the first 30 minutes of operation.

Except during malfunctions, the requirements of this subpart apply at all times, and each malfunction must not exceed 3 hours.

### **§ 60.2250 What are the emission limitations for air curtain incinerators?**

Within 60 days after your air curtain incinerator reaches the charge rate at which it will operate, but no later than 180 days after its initial startup, you must meet the two limitations specified in paragraphs (a) and (b) of this section.

Maintain opacity to less than or equal to 10 percent opacity (as determined by the average of three 1□hour blocks consisting of ten 6□minute average opacity values), except as described in paragraph (b) of this section.

Maintain opacity to less than or equal to 35 percent opacity (as determined by the average of three 1□hour blocks consisting of ten 6□minute average opacity values) during the startup period that is within the first 30 minutes of operation.

### **§ 60.2255 How must I monitor opacity for air curtain incinerators?**

Use Method 9 of appendix A of this part to determine compliance with the opacity limitation.

Conduct an initial test for opacity as specified in § 60.8.

After the initial test for opacity, conduct annual tests no more than 12 calendar months following the date of your previous test.



## **REGULATING AIR CURTAIN BURNERS**

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### **§ 60.2260 What are the recordkeeping and reporting requirements for air curtain incinerators?**

Prior to commencing construction on your air curtain incinerator, submit the three items described in paragraphs (a)(1) through (3) of this section.

Notification of your intent to construct the air curtain incinerators.

Your planned initial startup date.

Types of materials you plan to burn in your air curtain incinerator.

Keep records of results of all initial and annual opacity tests onsite in either paper copy or electronic format, unless the Administrator approves another format, for at least 5 years.

Make all records available for submittal to the Administrator or for an inspector's onsite review.

You must submit the results (each 6-minute average) of the initial opacity tests no later than 60 days following the initial test. Submit annual opacity test results within 12 months following the previous report.

Submit initial and annual opacity test reports as electronic or paper copy on or before the applicable submittal date.

Keep a copy of the initial and annual reports onsite for a period of 5 years.

### **Sub part EEEE (OSWI)**

#### **§ 60.2887 What combustion units are excluded from this subpart?**

This subpart excludes the types of units described in paragraphs (a) through (q) of this section, as long as you meet the requirements of this section.

*Note: We only included the paragraphs between (a) and (q) that are applicable to Air Curtain Incinerators. Temporary use incinerators and air curtain incinerators used in disaster recovery.*

Your incineration unit is excluded if it is used on a temporary basis to combust debris from a disaster or emergency such as a tornado, hurricane, flood, ice storm, high winds, or act of bioterrorism and you comply with the requirements in § 60.2969.

Units that combust contraband or prohibited goods.

Your incineration unit is excluded if the unit is owned or operated by a government agency such as police, customs, agricultural inspection, or a similar agency to destroy only illegal or prohibited goods such as illegal drugs, or agricultural food products that can not be transported into the country or across State lines to prevent biocontamination. The exclusion does not apply to items either confiscated or incinerated by private, industrial, or commercial entities.

## **REGULATING AIR CURTAIN BURNERS**

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### **§ 60.2888 Are air curtain incinerators regulated under this subpart?**

Air curtain incinerators that burn less than 35 tons per day of municipal solid waste or air curtain incinerators located at institutional facilities burning any amount of institutional waste generated at that facility are subject to all requirements of this subpart, including the emission limitations specified in table 1 of this subpart.

Air curtain incinerators that burn only less than 35 tons per day of the materials listed in paragraphs (b)(1) through (4) of this section collected from the general public and from residential, commercial, institutional, and industrial sources; or, air curtain incinerators located at institutional facilities that burn only the materials listed in paragraphs (b)(1) through (4) of this section generated at that facility, are required to meet only the requirements in

### **§§ 60.2970 through 60.2974 and are exempt from all other requirements of this subpart.**

100 percent wood waste.

100 percent clean lumber.

100 percent yard waste.

100 percent mixture of only wood waste, clean lumber, and/or yard waste.



S-327 FireBox



T-300 Trench Burner



S-327 FireBox



S-116R—Rolloff-Off FireBox



S-119R—Rolloff-Off FireBox



BurnBoss—Towable FireBox



T-300 Trench Burner at Burn Pit

## Related Reports

**Disposal of Woody Debris by Fire** with perfect combustion efficiency releases no Black Carbon and virtually only Bio-genic CO<sub>2</sub>, making this process carbon neutral.

[CLICK HERE](#)

**Air Curtain Burner vs. Wood Grinder - Disposal of Wood Waste**

A Comparison of Critical Emissions and Basic Economic Parameters from Two Disposal Methods.

[CLICK HERE](#)

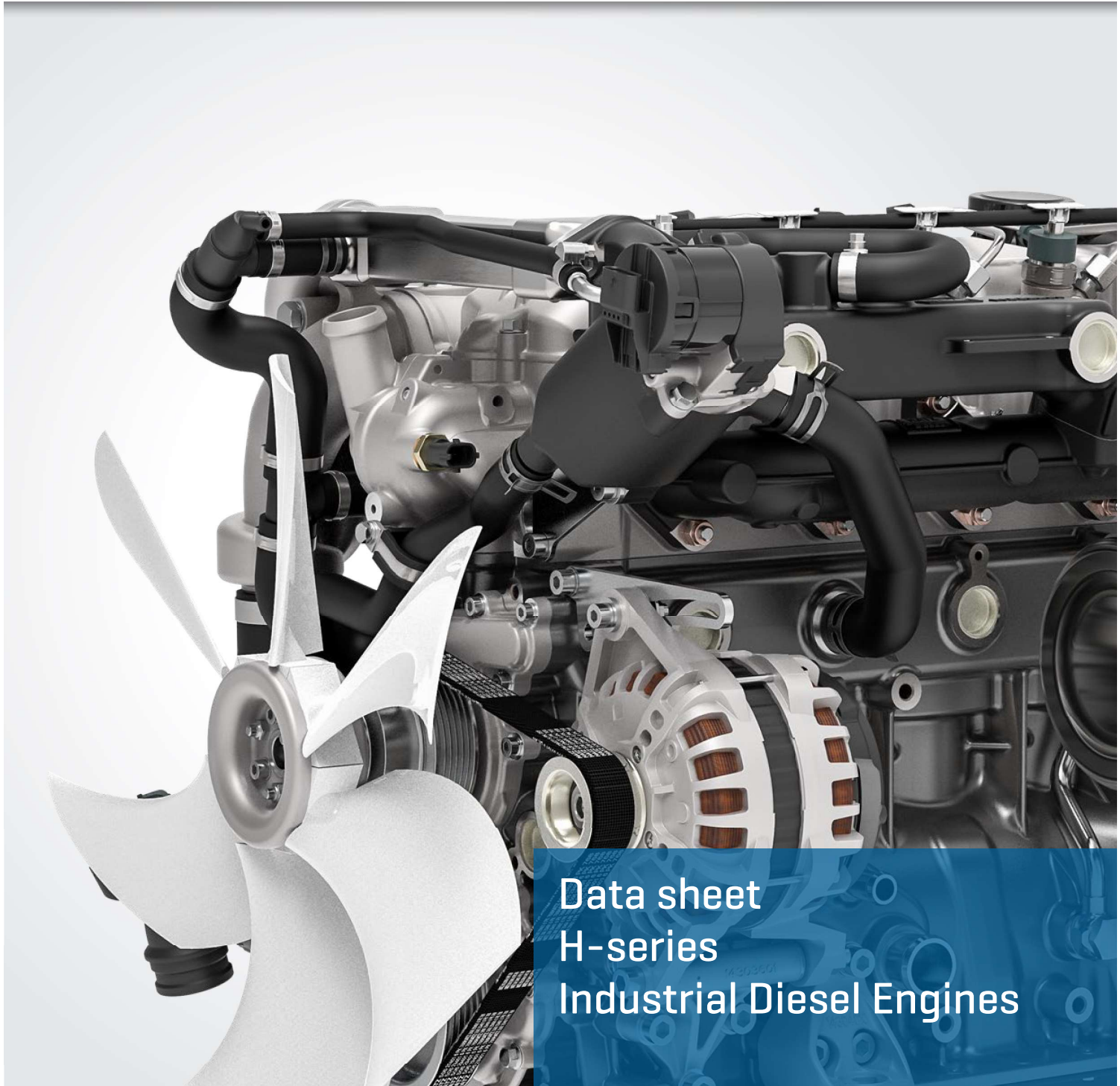
**Disposal of Trees Affected by the Pine Beetle - The Dilemma and why Air Curtain Burners Should Be Used.**

[CLICK HERE](#)

### **AIR BURNERS, INC.**

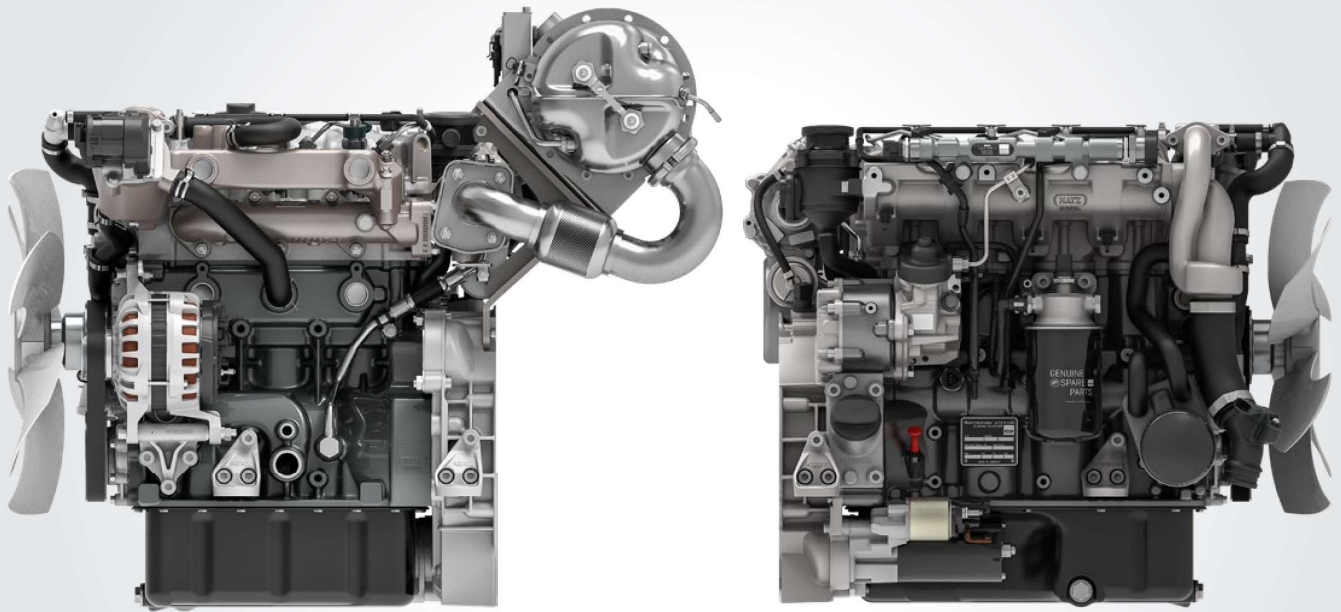
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CREATING  
POWER  
SOLUTIONS



Data sheet  
H-series  
Industrial Diesel Engines

Hatz Drive Solutions



### The Modern Three- and Four-Cylinder Power Packages

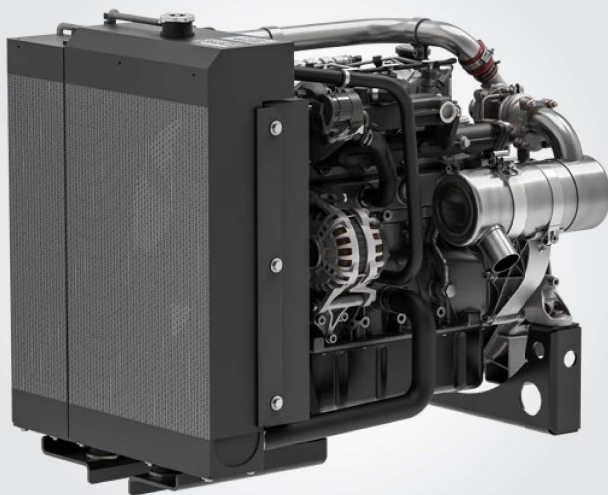
Compact, light, economical, robust and environmentally friendly: The new Hatz common-rail diesel engine provides everything expected from a powerful and modern industrial engine. It impresses through its quiet running, dynamics and maintenance friendliness. Its constantly low fuel consumption over a wide load range sets the benchmark. Only high quality parts are used in the H-series engines. These include an injection system and sensors from well-known manufacturers.

Supported by:



Federal Ministry  
for Economic Affairs  
and Energy

on the basis of a decision  
by the German Bundestag



### Open Power Unit – the Plug & Play Solution

All variants of the H-series are available as a ready-to-install OPU (Open Power Unit) and were completely tested by the manufacturer. In addition to the standard scope of delivery, air filter, radiators, charged air radiators, hoses and cable loom are already pre-installed in the delivery state.



### New Silent Pack – the Most Quiet Hatz Multi-Cylinder Engines

Based on the OPU version [see left] the Silent Packs are up to 60 percent more quiet. The powder-coated canopy made from sheet metal provides an efficient weather and touch protection as well. Nevertheless the released maximum ambient temperature is the same as the OPU.

# Hatz H-Series: Innovation Meets Reliability

A groundbreaking downsizing approach was adopted in the development of the Hatz H-series. The outcome are extremely compact, turbocharged engines that reach a maximum output of 64 kilowatts, setting benchmarks in their performance classes.

## Conservative-innovative engine for a long service life

The Hatz H-series has two valves per cylinder, which achieves high efficiency, mechanical robustness and functional simplicity. This – as well as the exclusive use of premium products for all important components – leads to the long service life customary from Hatz.

## Maintenance-friendly

The H-series also scores highly in terms of user friendliness. Firstly, all maintenance points are accessible on one side of the engine; secondly, the maintenance intervals of 500 engine hours are largely spaced. A hydraulic valve play compensation and generously sized filters make it possible. Longer maintenance intervals of up to 3000 hours can also be approved for defined applications.

## Environmental compliance

The Hatz H-series is up to 90 kilograms lighter compared to its nearest competitor. This weight saving not only results in a lower power-to-weight ratio, but also in a reduced need for raw materials. The engine family meets all emission requirements of the EU and the USA, the latter even without the use of a particulate filter.

## Common-rail system

One of the key factors for the high efficiency of the Hatz H-series is its injection technology: the Bosch common rail system in the more robust off-highway version. In conjunction with other ideally matched system components, the perfect balance between dynamics, quiet combustion noise, low emissions and economy is reached.

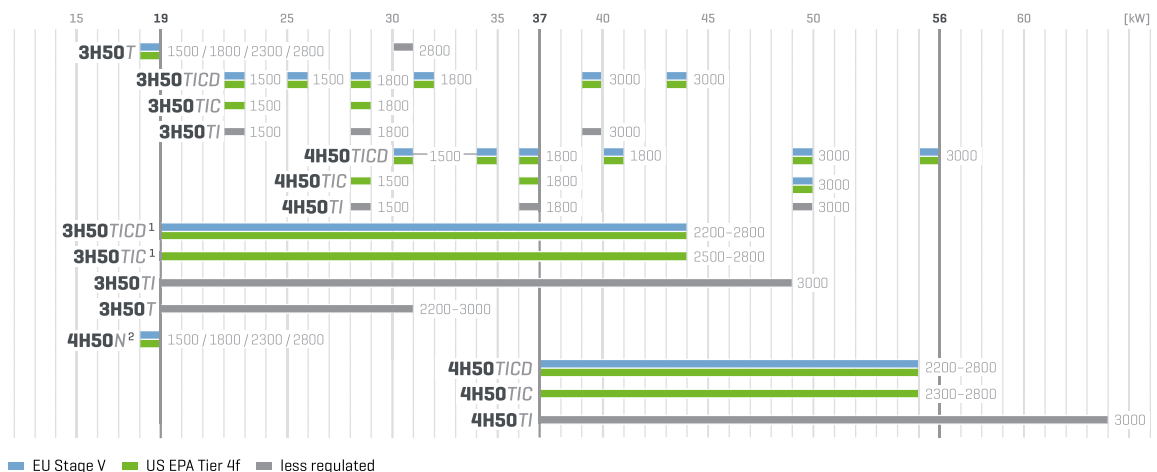
## Extraordinarily high fuel efficiency

When it comes to fuel efficiency, the Hatz H-series models with a specific fuel consumption of less than 210 grams per kilowatt hour at the most effective level set new standards. However, the special feature is that consumption economy values close to the optimum are also achieved over a large load and speed range. A key to the exceptionally high fuel efficiency is the reduction of internal friction, which is largely due to the conservative design with few moving parts. This makes each H-series model the most efficient engine in its power class.

## Raising digital potentials

The engines can be linked to the Hatz Digital Solutions. These allow key information on machine operation to be integrated into fleet management, thereby enabling machine operators to make better decisions. Also possible: optimization of the machine disposition and maintenance, localization and geofencing, and maximization of machine productivity.

H-series – power ranges, emission classes and rated speeds



<sup>1</sup> Also available with 36.4 kW @ 2500 rpm for use in California without registration requirements <sup>2</sup> Available as of 2024

# Technical Data, Performance Table

Technical data		3H50T	3H50TICD	3H50TIC	3H50TI	4H50N <sup>2</sup>	4H50TICD	4H50TIC	4H50TI	
Type	Liquid-cooled 4 stroke diesel engine									
Cylinder	3						4			
Injection system	Direct injection with Bosch off-highway common-rail system									
Injection pressure [bar]	1800									
Aspiration	Turbo without charge air cooling	Turbocharger with charge air cooling			—		Turbocharger with charge air cooling			
Exhaust emission after-treatment	—	gAGR, DOC, DPF	gAGR, DOC	—		gAGR, DOC, DPF	gAGR, DOC	—		
Bore x stroke [mm]	84 x 88									
Displacement [l]	1.464						1.952			
Mean piston speed @ 3000 rpm [m/s]	8.8									
Compression ratio	17.5:1									
Lubrication oil consumption, related to full load	max. 0.5 % of fuel consumption									
Oil filling	max. [l]	5.0			9.0		7.0			
	min. [l]	4.2			8.0		6.0			
Speed control	Lowest idle speed [rpm]	900			1250		900			
	Control method	CAN J1939 or multi-stage switch								
Installation information	Amount of combustion air @ 2800rpm approx. [kg/h]	199 <sup>8</sup>		260		111 <sup>8</sup>		340		
	Amount of cooling air @ 2800 rpm approx. [kg/h]	199 <sup>8</sup>		6650		111 <sup>8</sup>		6650		
	Mass moment of inertia J <sub>engine</sub> [kg m <sup>2</sup> ]	0.217						0.234		
	Starter [V]	12 [2.2 kW / 3.0 PS]   24 [3.0 kW / 4.1 PS]								
	Cold start temperature [°C]	-25 [12 V]   -32 [24 V]								
	Alternator charging [A]	110 [14 V] / 150 [14V. Option]   60 [28 V]								
	Battery capacity max. [Ah]	110 [12 V - 450 A DIN]   66 [24 V - 300 A DIN]								
Dimensions	Weight [kg]	Basic engine	132	140	154 <sup>3</sup>	133	159	158	173 <sup>3</sup>	152
		as Open Power Unit	147	222	236 <sup>3</sup>	215	174	240	255 <sup>3</sup>	234
		as New Silent Pack <sup>5</sup>	—	339 <sup>3</sup>	327 <sup>3</sup>	306	—	360 <sup>3</sup>	348 <sup>3</sup>	327
	L x W x H [mm] <sup>9</sup>	Basic engine	583 x 558 x 654	585 x 558 x 601	585 x 613 x 601 <sup>3</sup>	583 x 570 x 601	675 x 536 x 660	673 x 558 x 601	673 x 613 x 601 <sup>3</sup>	670 x 570 x 601
		as Open Power Unit	700 x 570 x 652	806 x 660 x 807	806 x 685 x 807 <sup>3</sup>	806 x 660 x 807	789 x 538 x 719	893 x 660 x 807	893 x 685 x 807 <sup>3</sup>	893 x 663 x 807
		as New Silent Pack <sup>5</sup>	—	1122 x 712 x 922 <sup>3</sup>	918 x 712 x 922 <sup>3</sup>	918 x 712 x 922	—	1213 x 712 x 922 <sup>3</sup>	1009 x 712 x 922 <sup>3</sup>	1009 x 712 x 922
<b>Engine output max. [kW/ hp]</b>		<b>[rpm]</b>	<b>3H50T</b>	<b>3H50TICD</b>	<b>3H50TIC</b>	<b>3H50TI</b>	<b>4H50N<sup>2</sup></b>	<b>4H50TICD</b>	<b>4H50TIC</b>	<b>4H50TI</b>
<b>Blocked ISO fuel stop power [IFN] for intermittent loading according to ISO 3046-1.<sup>6</sup> Applies to variable speed. 3H50TICD   3H50TIC</b> Also available with 36.4 kW / 49.4 hp @ 2500 rpm for use in California without registration requirements.	3000	—	—	—	44.2 / 59.2	—	—	55.4 / 74.2	—	55.0 / 73.7
	2800	18.4 / 24.7	43.7 / 58.6	—	43.6 / 58.4	—	—	55.4 / 74.2	—	55.4 / 74.2
	2300	18.4 / 24.7	42.8 / 57.4	—	41.5 / 55.6	—	—	55.4 / 74.2	—	55.4 / 74.2
	1800	18.4 / 24.7	35.4 / 47.4	—	35.4 / 47.4	—	—	45.7 / 61.2	—	45.4 / 61.2
	1500	18.4 / 24.7	28.6 / 38.3	—	28.6 / 38.3	—	—	37.4 / 50.1	—	37.4 / 50.1
<b>Blocked ISO fuel stop power [IFN] for intermittent load according to ISO 3046-1. Applies to constant speed.</b>	3000	—	43.6 / 58.4	—	—	—	—	55.4 / 74.2	—	—
	1800	—	31.3 / 41.9	—	31.3 / 41.9	—	—	41.0 / 55.0	41.0 / 55.0	—
	1500	—	25.5 / 34.2	—	25.5 / 34.2	—	—	35.0 / 46.9	35.0 / 46.9	—
<b>Blocked ISO fuel stop power [IFNs] for strongly intermittent load according to ISO 3046-1.<sup>7</sup></b>	2800	—	43.7 / 58.6 <sup>6</sup>	43.6 / 58.4 <sup>6</sup>	48.2 / 64.6	—	—	—	—	63.7 / 85.4
	2300	—	42.8 / 57.4 <sup>6</sup>	42.5 / 57.0 <sup>6</sup>	47.5 / 63.7	—	—	—	—	62.2 / 83.3
	1800	—	38.2 / 51.2 <sup>6</sup>	—	38.2 / 51.2	—	—	—	—	50.2 / 67.3
	1500	—	29.3 / 39.3 <sup>6</sup>	29.3 / 39.3 <sup>6</sup>	31.4 / 42.1	—	—	—	—	41.1 / 55.1
<b>Blocked ISO standard power [ICFN; not overloadable] according to ISO 3046-1. Applies to variable speed and constant load.</b> Note: Not available as power rating.	3000	—	—	—	39.8 / 53.3	—	—	49.9 / 66.9	—	49.5 / 66.3
	2800	18.4 / 24.7	39.3 / 52.7	—	39.2 / 52.5	—	—	49.9 / 66.9	—	49.9 / 66.9
	2300	18.4 / 24.7	38.3 / 51.3	—	37.4 / 50.1	—	—	49.9 / 66.9	—	49.9 / 66.9
	1800	18.4 / 24.7	31.9 / 42.7	—	31.9 / 42.7	18.4 / 24.7	—	41.1 / 55.1	—	41.3 / 54.3
	1500	18.4 / 24.7	25.7 / 34.4	—	25.7 / 34.4	18.4 / 24.7	—	33.7 / 45.2	—	33.7 / 45.2
<b>Blocked ISO standard power [ICFN; not overloadable] according to ISO 3046-1. Applies to constant speed and constant load [e. g. generators].</b>	3000	—	39.2 / 52.5	—	—	—	—	49.9 / 66.9	—	49.9 / 66.9
	1800	18.4 / 24.7	28.5 / 38.2	—	28.5 / 38.2	18.4 / 24.7	—	36.4 / 48.8	—	36.4 / 48.8
	1500	18.4 / 24.7	22.6 / 30.3	—	22.6 / 30.3	18.4 / 24.7	—	31.0 / 41.6	—	31.0 / 41.5

<sup>2</sup> Available as of 2024 <sup>3</sup> Including engine mounted aftertreatment <sup>4</sup> 2300/1800/1500: Based on 2800 rpm recordset, other settings on request.

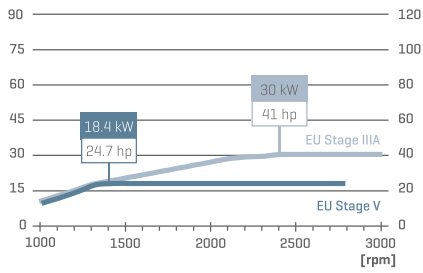
<sup>5</sup> 2300/1800/1500: Based on 2800 rpm recordset, other engine speed only with CAN limitation. <sup>6</sup> Same engine output as IFN, but higher torque.

<sup>7</sup> Spread at box dimensions ± 3 millimeters due to tolerance. <sup>8</sup> @ 2800 rpm ca.

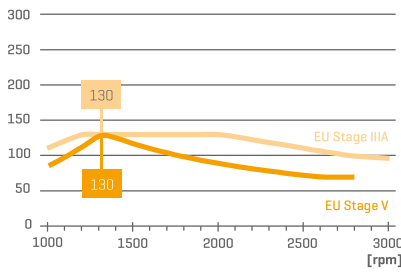
# Power Output, Torque and Fuel Consumption

## 3H50T

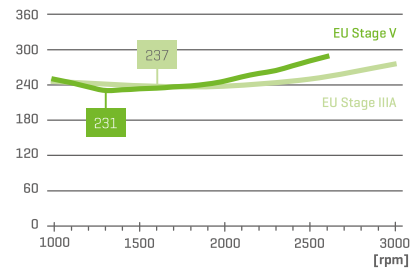
Output [kW / hp]



Torque [Nm]

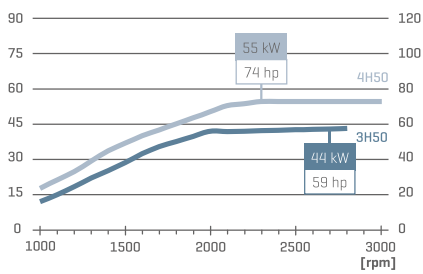


Fuel consumption [g/kWh]

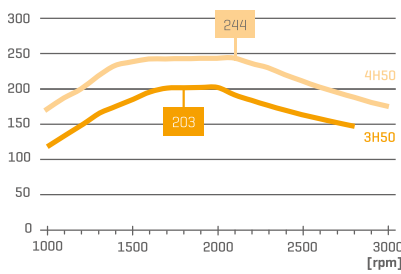


## 3H50TIC/TICD | 4H50TIC/TICD

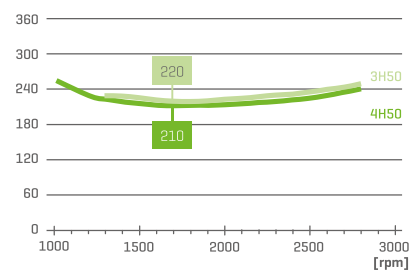
Output [kW / hp]



Torque [Nm]

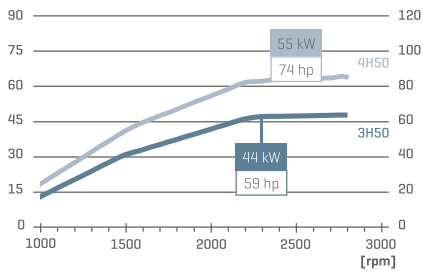


Fuel consumption [g/kWh]

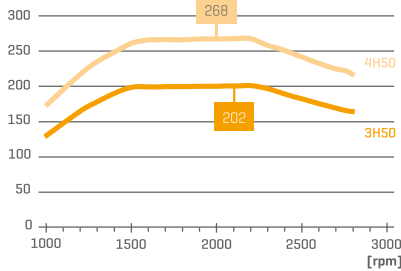


## 3H50TI | 4H50TI

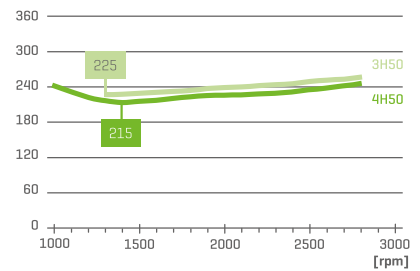
Output [kW / hp]



Torque [Nm]

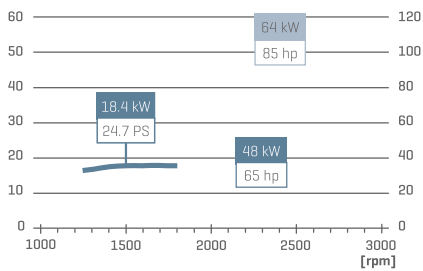


Fuel consumption [g/kWh]

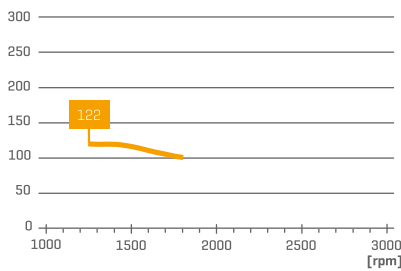


## 4H50N<sup>2</sup>

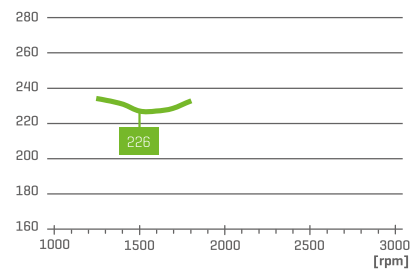
Output [kW / hp]



Torque [Nm]



Fuel consumption [g/kWh]

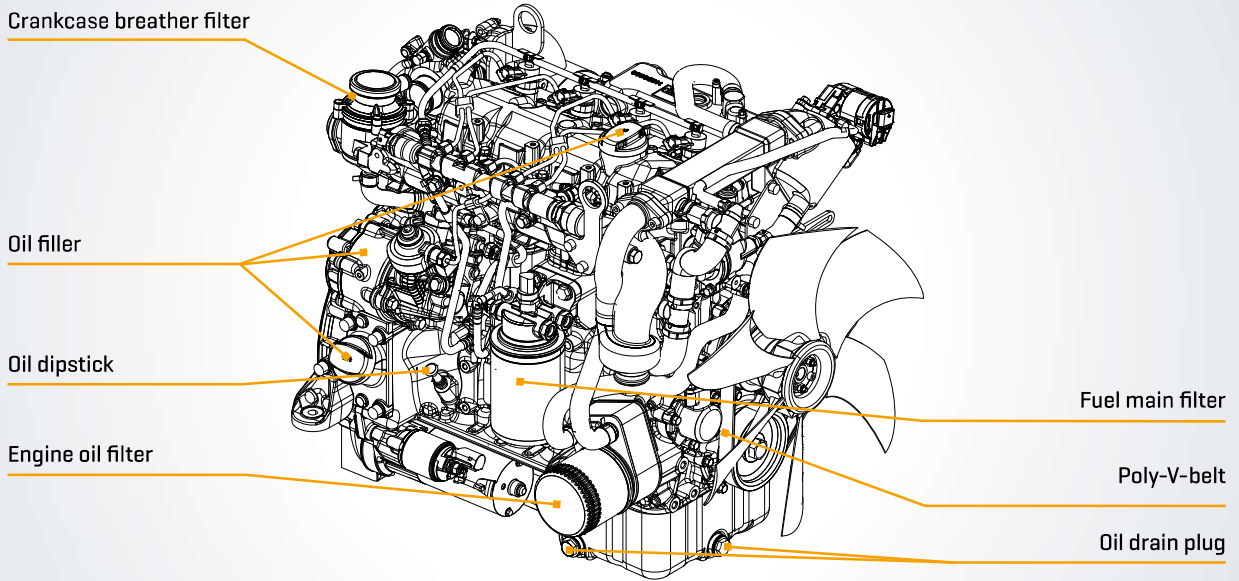


### Power ratings

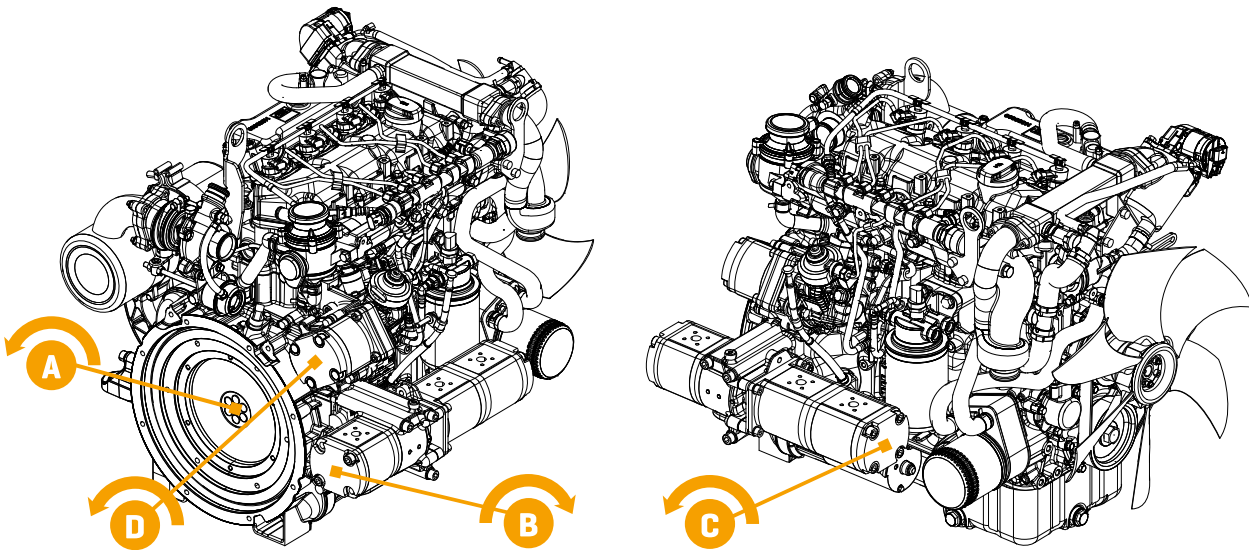
Power reduction chart available on request. Up to 1460 metres no power reduction. No power reduction necessary up to the released maximum ambient temperature. The power requirement of the alternator is already considered in the charts above.



## Maintenance and Operating Points



## Power Take-off



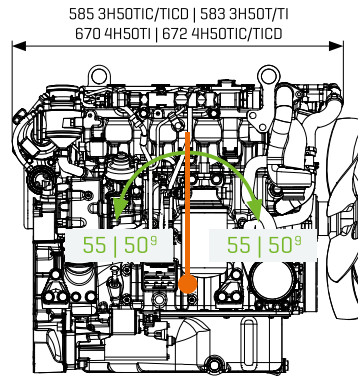
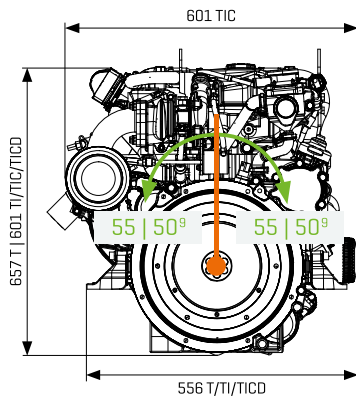
Power take-off		3H50T	3H50TICD	3H50TIC	3H50TI	4H50N <sup>2</sup>	4H50TICD	4H50TIC	4H50TI
Transmittable torque	A				100%				
	B				$\Sigma = 100 \text{ Nm}; i = 1.1$				
	C				$\Sigma = 80 \text{ Nm}; i = 1.0$				
	D				$\Sigma = 80 \text{ Nm}; i = 1.0$				

<sup>2</sup> Applies to 4H50 models only

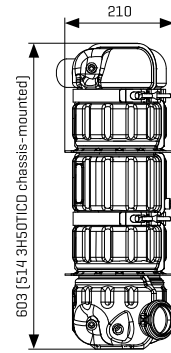
# Dimensions [mm] and Inclinations [°]

Dimensions for DPF on request.  
 Spread at box dimensions ± 3 millimeters due to tolerance.  
 Drawings with detail and connection dimensions as PDF and DXF  
 can be found at [hatz.com](http://hatz.com).

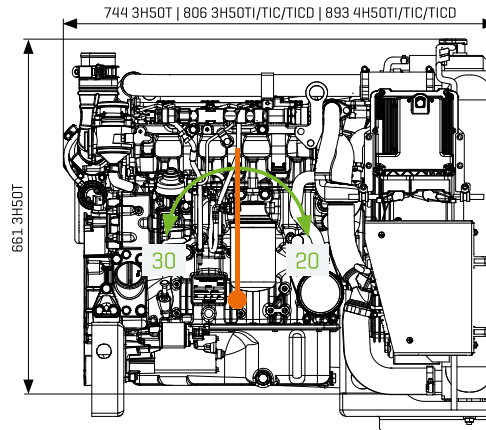
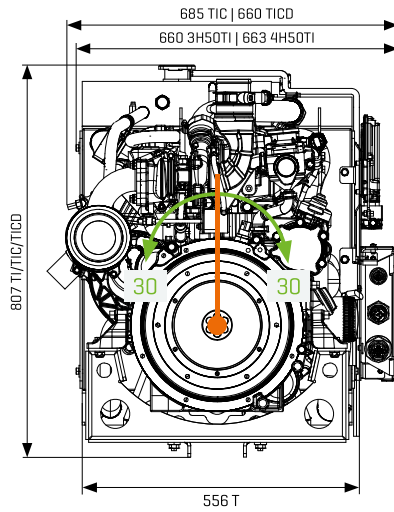
## Basic Engine



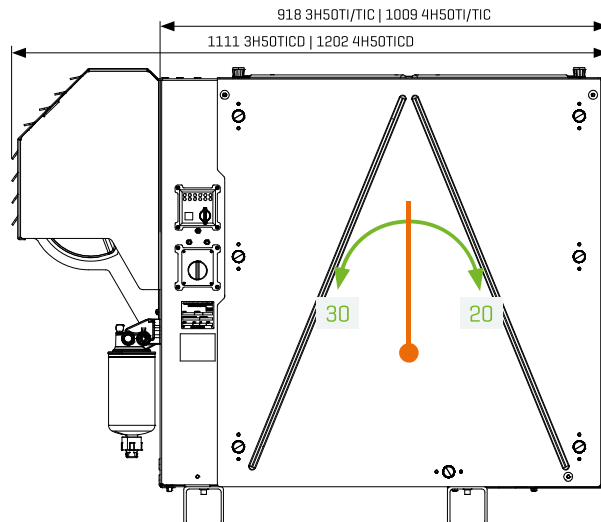
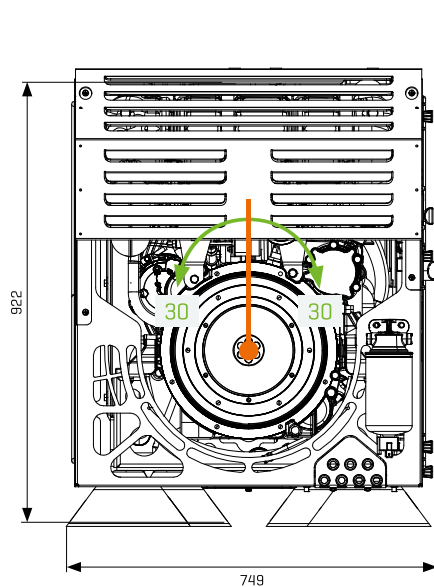
## DPF



## OPU (Open Power Unit)



## New Silent Pack



Motorenfabrik Hatz GmbH & Co. KG  
Ernst-Hatz-Str. 16  
94099 Ruhstorf a. d. Rott  
Germany  
Phone +49 8531 319-0  
marketing@hatz.com  
hatz.com



**CREATING  
POWER  
SOLUTIONS**

70257173 EN 10.22 Printed in Germany  
Modifications, which serve technical  
improvement, are reserved.



**AIR CURTAIN EMISSIONS STUDY  
(USDA FOREST SERVICE, ROCKY  
MOUNTAIN RESEARCH STATION)**



# Reducing PM2.5 Emissions Through Technology

Results from a Recent Study Evaluating the Effectiveness of an Air Curtain Incinerator

Ronald A Susott, Ronald Babbitt, Emily Lincoln, and Wei Min Hao

Contact [rbabbitt@fs.fed.us](mailto:rbabbitt@fs.fed.us)



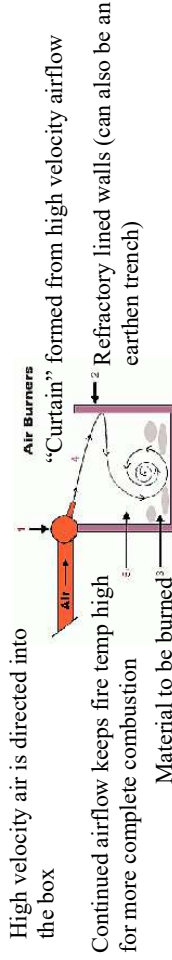
USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, Missoula, MT

## An Air Burners LLC 200 Series Incinerator in Operation



In October of 2002, scientists from the Missoula Fire Sciences Laboratory (FiSL) teamed with engineers from the San Dimas Technology and Development Center (SCTDC) to evaluate the performance of an air curtain incinerator. A model 217, with a capacity of 6 tons per hour, was provided by the manufacturer. Other air curtain burners, with through-puts ranging from 1 to 15 tons per hour, are available from Air Burners LLC. For more information contact them at [www.airburners.com](http://www.airburners.com)

## How the Incinerator Works



The curtain of air created in this process traps unburned fine particles under the curtain in the high temperature zone where temperatures can reach 1832° F (1000° C). The increased combustion time and turbulence results in a reburn and more complete combustion of the biomass.

## How Effective Was It in Reducing Emissions? Comparing Air Curtain to Pile and Understory Burn Emissions

Type of Burn	EF <sub>CO2</sub> (lbs/ton)	EF <sub>CO</sub> (lbs/ton)	EF <sub>CH4</sub> (lbs/ton)	EF <sub>NMHC</sub> (lbs/ton)	EF <sub>PM2.5</sub> (lbs/ton)	CR %
Average Pile	3268	179	13.9	9.9	25.5	89 %
Average Understory	3286	180	6.6	5.4	36.0	90 %
Average Air Curtain	3616	2.6	1.4	1.1	1.1	99 %

Emission Reduction Factors (EF common method/EF air curtain)		
Type of Burn	CH4	NMHC
Pile	10	9
Understory	5	5

With similar fuels (P.Pine), the air curtain incinerator tested gave approximately a 23-fold reduction in PM<sub>2.5</sub> emissions over pile burns and a 33-fold reduction over understory burns.

## Hot Stuff

The image to the right was taken with an infrared camera and shows the high ember production from the incinerator.

The incinerator requires a large operations area and the high quantity of embers ejected could pose a hazard at some locations.



## The Bottom Line

The air curtain incinerator is very effective in reducing PM<sub>2.5</sub> emissions.

Engineers at the SDTDC are currently performing a cost analysis—but the air curtain incinerator will likely be more costly than other common burning methods. SDTDC contact: Sue Zahn at [szahn@fl.fed.us](mailto:szahn@fl.fed.us)

High ember production could be a problem in some cases.

***Emission Factors Calculated for an Air  
Curtain Incinerator, Pile and  
Understory Burns with P. Pine as the  
Primary Type of Fuel***

Ronald A. Susott, Ronald Babbitt, Emily Lincoln, and Wei Min Hao  
USDA Forest Services, Rocky Mountain Research Station, Fire Sciences  
Laboratory, Missoula, MT  
Contact: rbabbitt@fs.fed.us (406) 329-4817

***Emission Factors for P.Pine Understory Burns***

***(AZ 1993=1994)***

Emission Factors for P.Pine Understory Burns							
Burn Type	EFCO2 (lbs/ton)	EFCO (lbs/ton)	EFCH4 (lbs/ton)	EF- NMHC (lbs/ton)	EFPM2.5 (lbs/ton)	CR Ratio	Fuel tons/acre
<b>8 year rotation under-burn</b>							
AZ1_93	3316	167	4.5	4.1	29.3	90%	5
AZ2_93	3334	156	5.1	5.4	26.6	91%	9
AZ4_94	3216	199	7.0	5.8	45.5	88%	35
<b>Broadcast burn</b>							
AZ3_93	3214	201	8.7	6.6	41.7	88%	49
AZ6_93	3288	187	7.6	5.5	50.7	90%	95
<b>First fire in 80+ years</b>							
AZ4_93	3296	173	6.2	5.7	28.9	90%	32
AZ5_93	3246	206	7.5	6.1	48.6	89%	55
AZ2_94	3250	141	5.1	3.9	31.7	91%	43
<b>6 year rotation under-burn</b>							
AZ1_94	3278	185	7.1	5.3	28.8	89%	14
<b>Under-burn, 3 years since last burn</b>							
AZ3_94	3438	114	3.5	3.5	13.3	94%	NA
<b>Average</b>	<b>3286</b>	<b>180</b>	<b>6.6</b>	<b>5.4</b>	<b>36.0</b>	<b>90%</b>	<b>37</b>

***Emission Factors for Air Curtain Burner  
(OR 2002)***

Air Curtain Emission Factors						
sample number	EFCO2 (lbs/ton)	EFCO (lbs/ton)	EFCH4 (lbs/ton)	EFNMHC (lbs/ton)	EFPM2.5 (lbs/ton)	CE %
	1	3634	1.6	1.1	0.9	
2	3636	1.7	0.9	0.6		99%
3	3589	4.0	2.6	1.7	1.1	98%
4	3613	2.8	1.5	1.2	1.1	98%
5	3646	1.1	0.6	0.5		99%
6	3587	4.1	2.7	1.7	0.9	98%
7	3624	2.3	0.6	0.7	0.9	99%
8	3603	3.4	1.2	1.2	1.7	98%
<b>Average</b>	<b>3616</b>	<b>2.6</b>	<b>1.4</b>	<b>1.1</b>	<b>1.1</b>	<b>99%</b>

***Emission Factors for P.Pine Pile Burns***

***(AZ 1994)***

Emission Factors for P.Pine Pile Burns						
Fire Code	EFCO2 (lbs/ton)	EFCO (lbs/ton)	EFCH4 (lbs/ton)	EFNMHC (lbs/ton)	EFPM2.5 (lbs/ton)	CE %
AZP1 Flaming	3462	100	7.4	5.9	11.7	95%
AZP1 Smoldering	3172	210	21.0	10.76	33.9	86%
AZP2 Flaming	3534	58	3.6	2.96	10.3	96%
AZP2 Smoldering	3160	247	20.3	10.5	15.0	86%
AZP3 Flaming	3454	97	5.0	5.7	13.8	94%
AZP3 Smoldering	3076	268	19.5	12.66	52.8	84%
AZP4 Flaming	3076	129	7.7	9.14	18.8	92%
AZP4 Smoldering	3056	277	22.2	12.98	34.7	83%
AZP5 Flaming	3092	115	7.9	10.42	18.6	92%
AZP5 Smoldering	3280	260	21.6	14.02	35.1	84%
AZP6 Flaming	3454	97	5.8	6.94	11.1	94%
AZP6 Smoldering	3008	285	24.5	16.84	49.9	82%
Average Flaming	3444	99	6.2	6.84	14.0	94%
Average Smoldering	3092	258	21.5	12.96	36.9	84%
<b>Average All</b>	<b>3268</b>	<b>179</b>	<b>13.9</b>	<b>9.9</b>	<b>25.5</b>	<b>89%</b>



**PERMIT APPLICATION FOR AIR CONTAMINANT SOURCES**  
 NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY  
 DIVISION OF AIR QUALITY  
 SFN 8516 (9-2021)

**SECTION A - FACILITY INFORMATION**

Name of Firm or Organization City of West Fargo				
Applicant's Name Dustin Scott				
Title City Administrator		Telephone Number (701) 515-5103		E-mail Address Dustin.Scott@westfargond.gov
Contact Person for Air Pollution Matters Matthew Andvik				
Title Public Works Director		Telephone Number (701) 515-5400		E-mail Address Matthew.Andvik@westfargond.gov
Mailing Address (Street & No.) 810 12th Ave N				
City West Fargo		State ND		ZIP Code 58078
Facility Name West Fargo Inert Landfill				
Facility Address (Street & No.) 806 26th Street NW				
City West Fargo		State ND		ZIP Code 58078
County <b>Cass</b>		Coordinates NAD 83 in Decimal Degrees (to fourth decimal degree)		
		Latitude 46.88615000	Longitude -96.95168000	
Legal Description of Facility Site <small>West Fargo Inert Landfill</small>				
Quarter NE	Quarter NE	Section 2	Township 139	Range 50
Land Area at Facility Site <small>12.3</small> Acres (or) _____ Sq. Ft.		MSL Elevation at Facility 892 feet		

**SECTION B – GENERAL NATURE OF BUSINESS**

Describe Nature of Business	North American Industry Classification System Number	Standard Industrial Classification Number (SIC)
Inert Waste Management Facility	562212	4953

**SECTION C – GENERAL PERMIT INFORMATION**

Type of Permit? <input checked="" type="checkbox"/> Permit to Construct (PTC) <input type="checkbox"/> Permit to Operate (PTO)	
If application is for a Permit to Construct, please provide the following data:	
Planned Start Construction Date 04/2024	Planned End Construction Date 07/2024

**SECTION D – SOURCE IDENTIFICATION AND CATEGORY OF EACH SOURCE INCLUDED ON THIS PERMIT APPLICATION**

Your Source ID Number	Source or Unit (Equipment, Machines, Devices, Boilers, Processes, Incinerators, Etc.)	Permit to Construct				Minor Source Permit to Operate						
		New Source	Existing Source Modification	Existing Source Expansion	Existing Source Change of Location	New Source	Existing Source Initial Application	Existing Source After Modification	Existing Source After Expansion	Existing Source After Change of Location	Existing Source After Change of Ownership	Other
EU 1	Air Curtain Incinerator	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Add additional pages if necessary

**SECTION D2 – APPLICABLE REGULATIONS**

Source ID No.	Applicable Regulations (NSPS/MACT/NESHAP/etc.)
Facility-wide	NSPS, NESHAP
Air Curtain Incinerator	NSPS Subpart CCCC for Commercial and Industrial Solid Waste Incineration Units
Engines	NSPS IIII, NESHAP ZZZZ

**SECTION E – TOTAL POTENTIAL EMISSIONS**

Pollutant	Amount (Tons Per Year)
NO <sub>x</sub>	62.63
CO	138.83
PM	58.53



Pollutant	Amount (Tons Per Year)
PM <sub>10</sub> (filterable and condensable)	58.53
PM <sub>2.5</sub> (filterable and condensable)	58.53
SO <sub>2</sub>	5.92
VOC	48.12
GHG (as CO <sub>2</sub> e)	190,510
Largest Single HAP	0.0027
Total HAPS	0.009

\*If performance test results are available for the unit, submit a copy of test with this application. If manufacturer guarantee is used provide spec sheet.

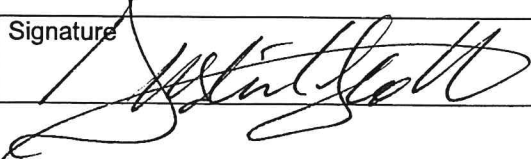
**SECTION F1 – ADDITIONAL FORMS**

Indicate which of the following forms are attached and made part of the application	
<input type="checkbox"/> Air Pollution Control Equipment (SFN 8532) <input checked="" type="checkbox"/> Construct/Operate Incinerators (SFN 8522) <input type="checkbox"/> Natural Gas Processing Plants (SFN 11408) <input type="checkbox"/> Glycol Dehydration Units (SFN 58923) <input type="checkbox"/> Flares (SFN 59652) <input type="checkbox"/> Grain, Feed, and Fertilizer Operations (SFN 8524)	<input type="checkbox"/> Fuel Burning Equipment Used for Indirect Heating (SFN 8518) <input type="checkbox"/> Hazardous Air Pollutant (HAP) Sources (SFN 8329) <input type="checkbox"/> Manufacturing or Processing Equipment (SFN 8520) <input type="checkbox"/> Volatile Organic Compounds Storage Tank (SFN 8535) <input checked="" type="checkbox"/> Internal Combustion Engines and Turbines (SFN 8891) <input type="checkbox"/> Oil/Gas Production Facility Registration (SFN 14334)

**SECTION F2 – OTHER ATTACHMENTS INCLUDED AS PART OF THIS APPLICATION**

1. Site Plan with Proposed Air Curtain Location	4. Manufacturer Estimated Emission Calculation Reports
2. Air Curtain Incinerator and Engine Emission Calculations	5. Air Curtain Emissions Study (USDA Forest Service, Rocky Mountain Research Station)
3. Air Curtain Incinerator and Engine Manufacturer Data	6.

I, the undersigned applicant, am fully aware that statements made in this application and the attached exhibits and statements constitute the application for Permit(s) to Construct and/or Operate Air Contaminant sources from the North Dakota Department of Environmental Quality and certify that the information in this application is true, correct and complete to the best of my knowledge and belief. Further, I agree to comply with the provisions of Chapter 23.1-06 of the North Dakota Century Code and all rules and regulations of the Department, or revisions thereof. I also understand the permit is nontransferable and, if granted a permit, I will promptly notify the Department upon sale or legal transfer of this permitted establishment.

Signature 	Date 1/11/2024
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## INSTRUCTIONS

### SITE PLANS TO BE ATTACHED TO APPLICATION:

**Prepare and attach a plot plan drawn to scale or properly dimensioned, showing at least the following:**

- a. The property involved and the outlines and heights of all buildings on the property. Identify property lines plainly. Also, indicate if there is a fence around the property that prevents public access.
- b. Location and identification of all existing or proposed equipment, manufacturing processes, etc., and points of emission or discharge of air contaminants to the atmosphere.
- c. Location of the facility or property with respect to the surrounding area, including residences, businesses and other permanent structures, streets and roadways. Identify all such structures and roadways. Indicate direction (**NORTH**) on the drawing and the prevailing wind direction.

### EQUIPMENT PLANS AND SPECIFICATIONS FOR PERMIT TO CONSTRUCT:

**Supply plans and specifications, including as a minimum an assembly drawing, dimensioned and to scale, in plan, elevation and as many sections as are needed to show clearly the design and operation of the equipment and the means by which air contaminants are controlled.**

The following must be shown:

- a. Size and shape of the equipment. Show exterior and interior dimensions and features.
- b. Locations, sizes, and shape details of all features which may affect the production, collection, conveying, or control of air contaminants of any kind, location, size, and shape details concerning all material handling equipment.
- c. All data and calculations used in selecting or designing the equipment.
- d. Horsepower rating of all internal combustion engines driving the equipment.

**NOTE: STRUCTURAL DESIGN CALCULATIONS AND DETAILS ARE NOT REQUIRED. WHEN STANDARD COMMERCIAL EQUIPMENT IS TO BE INSTALLED, THE MANUFACTURER'S CATALOG DESCRIBING THE EQUIPMENT MAY BE SUBMITTED IN LIEU OF ITEMS a, b, c, and d OF ABOVE, WHICH THE CATALOG COVERS. ALL INFORMATION REQUIRED ABOVE THAT THE CATALOG DOES NOT CONTAIN MUST BE SUBMITTED BY THE APPLICANT.**

### ADDITIONAL INFORMATION MAY BE REQUIRED:

**If the application is signed by an authorized representative of the owner, a LETTER OF AUTHORIZATION must be attached to the application.**

### SEND COMPLETED APPLICATION AND ALL ATTACHMENTS TO:

North Dakota Department of Environmental Quality  
Division of Air Quality  
4201 Normandy Street, 2<sup>nd</sup> Floor  
Bismarck, ND 58503-1324  
(701) 328-5188