



Guidelines for Calculating and Reporting Emissions from Laser or Plasma Cutting of Metal Materials Operations

December 2024

Fume emissions from laser or plasma cutting should follow the EPA AP-42 guidance ([Emission of Fume, Nitrogen Oxide and Noise in Plasma Cutting of Stainless and Mild Steel](#)).

PM Emissions

Fumes should be considered PM emissions. The tables from the EPA document have been converted into imperial units.

Emissions of Fumes in Plasma Cutting of Mild and Stainless Steel

Material, thickness	Dry (lb/min)	Semi-Dry (lb/min)	Wet (lb/min)
Mild steel, 8 mm	0.057	0.0088	0.00088
Stainless steel, 8 mm	0.088	0.0101	0.0011
Stainless steel, 35 mm	0.0075	0.00066	0.000044

Emissions of Fumes Expressed as Percent of Total Amount of Material Removed by Cutting

Material, thickness, cutting speed	Dry (%)	Semi-Dry (%)	Wet (%)
Mild steel, 8 mm, 5 m/min	5	0.5	0.05
Stainless steel, 8 mm, 3.5 m/min	7	0.7	0.07
Stainless steel, 35 mm, 0.375 m/min	1	0.1	0.01

NOx Emissions

The tables from the EPA document have been converted into imperial units.

Emissions of Nitrogen Oxides	Dry (lb/min)	Semi-Dry (lb/min)	Wet (lb/min)
Mild steel, 8 mm	0.023	0.013	0.007
Stainless steel, 8 mm	0.023	0.011	0.006
Stainless steel, 35 mm	0.033	0.019	0.009

TAC Emissions

TAC emissions are estimated by multiplying the weight fraction of the TACs from SDSs by the PM emissions above. If SDS values are not available, the following defaults from the EPA document may be used.

Components in Fume	Manganese (%)	Copper (%)	Hexavalent Chromium (%)	Nickel (%)	Molybdenum (%)
Mild Steel	1.4	1.4			
Stainless Steel	10	6	20	8	1

Example

Two hours of 8 mm stainless steel were cut in the data year using a semi-wet process. Since we record two hours per year. The emission factors need to be converted from mins to hours.

PM emission factor, lb/hr = 60 min/hr x 0.0101 lb PM/min = 0.606 lb/hr

NO_x emission factor, lb/hr = 60 min/hr x 0.011 lb NO_x/min = 1.32 lb/hr

Manganese emission factor, lb/hr = PM EF x 0.1 = 0.0606

Copper emission factor, lb/hr = PM EF x 0.06 = 0.364

Hexavalent chromium emission factor, lb/hr = PM EF x 0.2 = 0.121

Nickel emission factor, lb/hr = PM EF x 0.08 = 0.0485

Molybdenum emission factor, lb/hr = PM EF x 0.01 = 0.0606

Entering Data into the AER Webtool

Click on Emission Sources (ES) on the menu on the left-hand side. Then click on the orange Add New Emission Source button

Facility ID: 999901

Build Reporting Structure

Emission Sources (ES) Classification

Summary: This section contains facility permit profile. Please make sure that every device has a specified Emission Source (ES). New emission sources can also be added.

Instruction: Add Devices (emissions sources) by clicking "Add New Emission Source". Edit devices by clicking "Profile" under the Emission Source (ES) Column. Add emission data by clicking "Open" under the Emissions column. Upload storage tank data by clicking on link "Click here" below.

Storage Tank Emissions Batch File Import - [Click here](#) for more instructions.

Add New Emission Source

Facility Comments

1. Facility Information
2. Status Update
3. Combustion Fuels
4. Emission Sources (ES)
5. Report Process/Emissions
6. Additional Toxic Substances Production and Usage
7. Perform Data Validation
8. Review Summaries
9. Print Facility Report
10. Report Submission

Enter data in the text boxes with the red asterisk, then click on the orange Categorize Emission Sources button.

Facility ID: 999901

Facility Comments

- 1. Facility Information
- 2. Status Update
- 3. Combustion Fuels
- 4. Emission Sources (ES)
- 5. Report Process/Emissions
- 6. Additional Toxic Substances Production and Usage
- 7. Perform Data Validation
- 8. Review Summaries
- 9. Print Facility Report
- 10. Report Submission

Edit Emission Source

Instruction: Add new emissions sources using information found on permits, manufacturers specifications, or identifying placards. Select the Operating ES Status that best reflect the device's operation for this reporting period. All areas with a Red Asterisk (*) must be addressed. Note: Some devices have been pre-populated, verify that the information is correct

Permitted

A/N

PERP Equipment(CARB's Portable Equipment Registration Program)

Permit No

Permit Device ID

Permit Equipment Description

AER Device ID ES7

ES Name Plasma Arc Cutting *

Operating ES Status Normal Operation *

Comment

Other Processes

Emission Source Category

Equipment Other process equipment

Design Capacity 0.000000

or or

or [Cancel](#)

Optional:

[Click here to delete](#) this emission source and associated data.

Click on the Other Process check box and click save.

Categorize Emission Source

Permitted	A/N	Permit No	Permit Device ID	Permit Equipment Description	AER Device ID	ES Name
No					ES7	Plasma Arc Cutting

- External Combustion Equipment (e.g., boiler, dryer, oven, furnace, heater, afterburner, flare, kiln or incinerator) [click here](#) to select one of the following Equipment:
- Internal Combustion Equipment (e.g., internal combustion engine (excluding vehicles), turbine or micro turbine) [click here](#) to select one of the following Equipment:
- Spray Coating/Spray Booth (e.g., coatings, solvents, adhesives, etc.) [click here](#) to select one of the following Equipment:
- Other Use of Organics (e.g., coatings, solvents, inks, adhesives, etc.) except in Spray Coating/Spray Booth, [click here](#) to select one of the following Equipment:
- Liquid Storage Tank (e.g. Underground, Aboveground, Small Tanks, Dispensing Systems) [click here](#) to select one of the following Equipment:
- Fugitive Components (Emission Leaks from Process Components per Rule 462, 1173 and 1176), [click here](#) to select all applicable Equipment:
- Other Processes (does not fit in any of the groups mentioned above), click [click here](#) to mark "Other Process Equipment":
 - Other process equipment

Click on the orange Save and Proceed to Process Reporting button

Facility ID: 999901

Facility Comments


- 1. Facility Information
- 2. Status Update
- 3. Combustion Fuels
- 4. Emission Sources (ES)
- 5. Report Process/Emissions
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- 8. Review Summaries
- 9. Print Facility Report
- 10. Report Submission

Edit Emission Source

Instruction: Add new emissions sources using information found on permits, manufacturers specifications, or identifying placards. Select the Operating ES Status that best reflect the device's operation for this reporting period. All areas with a Red Asterisk (*) must be addressed. Note: Some devices have been pre-populated, verify that the information is correct

Permitted

A/N

PERP Equipment(CARB's Portable Equipment Registration Program) 

Permit No

Permit Device ID

Permit Equipment Description

AER Device ID ES7 Assign new ID

ES Name *

Operating ES Status *

Comment

Emission Source Category Other Processes Categorize Emission Source *

Equipment Other process equipment

Design Capacity

Save or Save and return to List of Emission Sources or

Save and proceed to Process Reporting or [Cancel](#)

Optional: Save and Mark as Completed


Click here to [delete](#) this emission source and associated data.

Click on the blue Open link next to Process ID P1

Process References ✕

Emissions	A/N	Permit No	Permit Device ID	Permit Device Description	AER Device ID	ES Name	ES Group Name	Source Category	Emissions?	Equipment	PERP	Release Location Linked
Open					ES7	Plasma Arc Cutting		Other Processes	Y	Other process equipment	N	NR

	Process ID	Source Group	Process/Material/Fuel Name	Status	Operation Type
Open	P1	Other Process Emissions		Work in progress	routine

Add Process/Material/Fuel 

OK

Click on the blue Open link in Step 1

« Back to Emission Source Process Reference

Other Processes

This reporting screen is for reporting activity data for other processes used in your facility which were not covered in previous reporting screens. Please provide specific information for every associated emission source. Please start with Step 1, edits to Step 1 may cause data in the following steps to reset. Combustion emissions need to be reported separately under external or internal combustion process categories. Combined emissions can also be reported here; however, it must be substantiated to avoid double reporting. Detailed instructions are available by clicking on Help icon in the tool bar.

Step 1: Process

Optional: Mark as Completed

	AER Device ID	Permit Device ID	A/N	Process ID	Rule #	Activity	SCC
Open	ES7			P1	405	Metals and Alloys : Fabricated : Machining Operations : Arc Welding: General	

Click here to [delete](#) this process.

Step 2: Throughput

	Annual Throughput
Open	

Step 3: Criteria Emissions (lbs)

Use [Default Emission Factors](#) if available.

	Pollutant	EF	Unit	Controlled EF	EF Data Source	Overall CE	Emissions
Add New							

Step 4: Toxic (TAC/ODC) Emissions (lbs)

Use [Default Emission Factors](#) if available.

	TAC/ODC Group	CAS #	EF	Unit	Controlled EF	EF Data Source	Overall CE	Emissions
Add New								

« Back to Emission Source Process Reference

Choose the following options and click save.

Edit Emission Process - Other Processes

AER Device ID	Permit Device ID	A/N	Process ID	Rule #	Activity	SCC
ES7			P1			

AER Device ID	ES7	AER Device Name	Plasma Arc Cutting
NON-PERMITTED		Permit Device ID	
Process ID	P1	Process Name	
Process Comment	<input type="text"/>		
SCC	<input type="text"/>		
Activity Code *	Sector: <input type="text" value="Metals and Alloys"/>		
	Industry: <input type="text" value="Fabricated"/>		
	Operation: <input type="text" value="Machining Operations"/>		
	Process: <input type="text" value="Arc Welding: General"/>		
Rule #	405	* Add Rule	

Click on the blue Open link in Step 2

« Back to Emission Source Process Reference

Other Processes

This reporting screen is for reporting activity data for other processes used in your facility which were not covered in previous reporting screens. Please provide specific information for every associated emission source. Please start with Step 1, edits to Step 1 may cause data in the following steps to reset. Combustion emissions need to be reported separately under external or internal combustion process categories. Combined emissions can also be reported here; however, it must be substantiated to avoid double reporting. Detailed instructions are available by clicking on Help icon in the tool bar.

Step 1: Process Optional: Mark as Completed

	AER Device ID	Permit Device ID	A/N	Process ID	Rule #	Activity	SCC
Open	ES7			P1	405	Metals and Alloys : Fabricated : Machining Operations : Arc Welding: General	

[Click here to delete this process.](#)

Step 2: Throughput

Annual Throughput	
Open	

Step 3: Criteria Emissions (lbs) Use [Default Emission Factors](#) if available.

Pollutant	EF	Unit	Controlled EF	EF Data Source	Overall CE	Emissions
Add New						

Step 4: Toxic (TAC/ODC) Emissions (lbs) Use [Default Emission Factors](#) if available.

TAC/ODC Group	CAS #	EF	Unit	Controlled EF	EF Data Source	Overall CE	Emissions
Add New							

« Back to Emission Source Process Reference

Add the throughput, throughput type, throughput origin, and throughput comment. Then, click the orange Save button.

Edit Throughput Information - Other Processes

AER Device ID	Permit Device ID	A/N	Process ID	Rule #	Activity	SCC
ES7			P1	405	Metals and Alloys : Fabricated : Machining Operations : Arc Welding: General	

Annual Throughput

Annual Throughput: 2.00000000 * hour *

Throughput Type: Input *

Throughput Origin: Direct measurement *

Throughput Comment: Logbook

[Save](#) [Cancel](#)

Click on the orange Add New button in Step 3

« Back to Emission Source Process Reference

Other Processes

This reporting screen is for reporting activity data for other processes used in your facility which were not covered in previous reporting screens. Please provide specific information for every associated emission source. Please start with Step 1, edits to Step 1 may cause data in the following steps to reset. Combustion emissions need to be reported separately under external or internal combustion process categories. Combined emissions can also be reported here; however, it must be substantiated to avoid double reporting. Detailed instructions are available by clicking on Help icon in the tool bar.

Step 1: Process

Optional: Mark as Completed

	AER Device ID	Permit Device ID	A/N	Process ID	Rule #	Activity	SCC
Open	ES7			P1	405	Metals and Alloys : Fabricated : Machining Operations : Arc Welding: General	

Click here to [delete](#) this process.

Step 2: Throughput

	Annual Throughput
Open	

Step 3: Criteria Emissions (lbs)

Use [Default Emission Factors](#) if available.

	Pollutant	EF	Unit	Controlled EF	EF Data Source	Overall CE	Emissions
Add New							

Step 4: Toxic (TAC/ODC) Emissions (lbs)

Use [Default Emission Factors](#) if available.

	TAC/ODC Group	CAS #	EF	Unit	Controlled EF	EF Data Source	Overall CE	Emissions
Add New								

« Back to Emission Source Process Reference

Choose PM as the pollutant, and the emission factor, and chose AP-42 for the emission factor data source. Then click the orange Save button.

Open Criteria Emission Information - Other Processes ✕

AER Device ID	Permit Device ID	A/N	Process ID	Rule #	Activity	SCC
ES7			P1	405	Metals and Alloys : Fabricated : Machining Operations : Arc Welding: General	

Annual Throughput

Pollutant: PM *

Emission Factor (EF): 6.06000000e-1 * lbs/

Controlled EF value
(mark checkbox if EF listed represents EF determined after control)

Overall Control Efficiency:

Emission Factor Comment:

If not using **AQMD default** emission factor please provide detailed references in the Emission Factor Comment box above or upload file with the information. Processes without this information are subject to audit.

Emission Factor Data Source: AP-42 *

Emissions: 0.00000000e+0 lbs

Save
Cancel

Repeat this process for NOx.

Click on the orange Add New button in Step 4

Other Processes

This reporting screen is for reporting activity data for other processes used in your facility which were not covered in previous reporting screens. Please provide specific information for every associated emission source. Please start with Step 1, edits to Step 1 may cause data in the following steps to reset. Combustion emissions need to be reported separately under external or internal combustion process categories. Combined emissions can also be reported here; however, it must be substantiated to avoid double reporting. Detailed instructions are available by clicking on Help icon in the tool bar.

Step 1: Process

Optional: Mark as Completed

	AER Device ID	Permit Device ID	A/N	Process ID	Rule #	Activity	SCC
Open	E57			P1	405	Metals and Alloys : Fabricated : Machining Operations : Arc Welding: General	

Click here to [delete](#) this process.

Step 2: Throughput

	Annual Throughput
Open	2.00000000 hour

Step 3: Criteria Emissions (lbs)

Use [Default Emission Factors](#) if available.

	Pollutant	EF	Unit	Controlled EF	EF Data Source	Overall CE	Emissions
Open	PM	6.06000000e-1	lbs / hour	No	AP-42		1.21200000e+0
Open	NOx	6.60000000e-1	lbs / hour	No	AP-42		1.32000000e+0

Add New

Step 4: Toxic (TAC/ODC) Emissions (lbs)

Use [Default Emission Factors](#) if available.

	TAC/ODC Group	CAS #	EF	Unit	Controlled EF	EF Data Source	Overall CE	Emissions
Add New								

Choose Manganese, enter the emission factor and choose AP-42 for the emission factor data source.

Open Toxic (TAC/ODC) Emission Information - Other Processes

AER Device ID	Permit Device ID	A/N	Process ID	Rule #	Activity	SCC
E57			P1	405	Metals and Alloys : Fabricated : Machining Operations : Arc Welding: General	

Annual Throughput
2.00000000 hour

TAC/ODC Toxic Pollutants / Ozone Depleting Compounds

TAC Group: 49 - Manganese
CAS # (Pollutant): 7439965 - Manganese
Emission Factor (EF): * lbs/hour
 Controlled EF value
(mark checkbox if EF listed represents EF determined after control)

Overall Control Efficiency:

Emission Factor Comment:

If not using AQMD default emission factor please provide detailed references in the Emission Factor Comment box above or upload file with the information. Processes without this information are subject to audit.

Emission Factor Data Source: *
Emissions: 1.21200000e-1 lbs

Click here to [delete](#) this Emission.

Repeat for the other TAC emissions.