



**Approval Process for Trailer Aerodynamic
Improvement Devices
Guidance for Component Manufacturers**

EPA Webinar
March 21, 2017

Outline

- Who must use this approval process and why?
- Timeline
- Aero Device Approval Request Process
- Account Setup Process
- Demonstration of Request for Device Approval
- Contacts & More Information

Who must use the approval process and why?

- Who must use this process?
 - Aerodynamic device manufacturers who wish to have their devices be available for Phase 2 certification of trailers must submit requests as described in this guidance.
 - Company authorizing officials (CAO) may assign data entry privileges to other users (such as a consultant).
- Why must approval occur before certification?
 - Obtaining approval of aerodynamic test data for trailer devices will allow the trailer certification process to be swift and efficient.

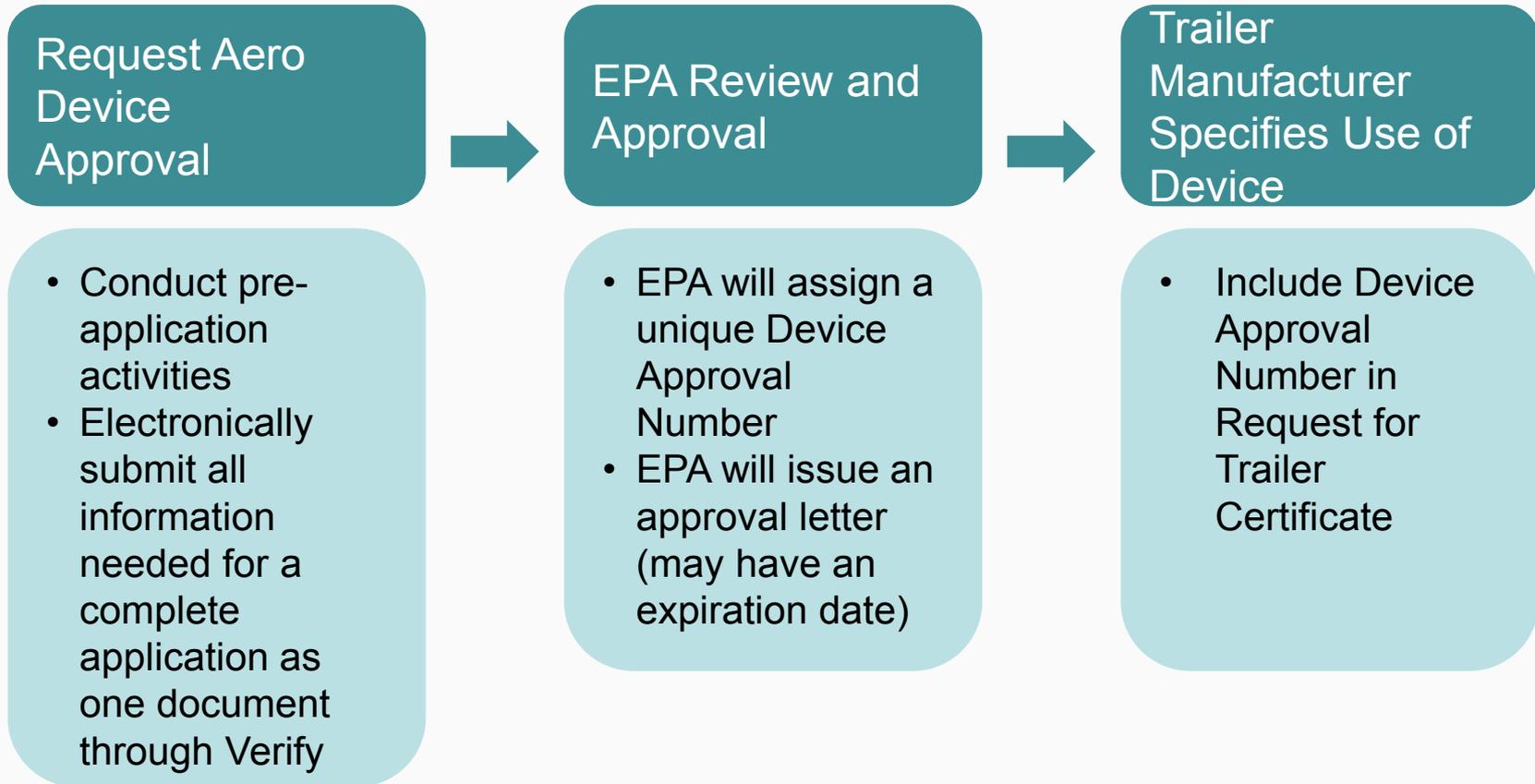
Timeline

- Aero device approval requests may be submitted beginning in March 2017
- Launch of Verify Trailer Certification Module expected fall 2017
 - *Beta testing expected summer 2017*
 - Manufacturers of trailer families using aerodynamic improvements as part of a compliance plan must ensure that all planned devices have received device approval codes before submitting request for certificate.
 - Reviews of requests for certificate will be delayed if an aero device is listed without a valid approval number.
- Trailers entered into commerce on or after January 1, 2018 must be covered by a valid certificate (except where excluded)



TRAILER AERO DEVICE APPROVAL REQUEST PROCESS

Process Overview: Aero Device Approval Process



Conduct Pre-Application Activities

- Conduct aerodynamic testing
- Decide which trailer types are suitable for the device
- Trailer manufacturers: include whether you will make your device commercially available
- Evaluate to what extent trailer manufacturers may combine the device with other devices sold separately
- Review the checklist to understand what else is required in a complete application

Aero Device Approval Request Checklist

All of the following information must be compiled and submitted through Verify in a single electronic file:

Manufacturer code	Installation instructions
Manufacturer name & address	Warranty statement *
Date of request	Maintenance instructions *
Device model/trade name	Name/address of test facility
Device description, including single or package	SmartWay verification letter (if applicable)
Incompatibilities with other devices	Delta CdA, in m ² , to 2 decimal places
Suitable trailer subcategories	If also trailer OEM, commercial availability
Description of testing facility and test protocol	Description of the <i>standard tractor</i> and its aerodynamic performance level
Component part numbers	Description of the tested trailer, both as baseline “A” and with improvements “B”
Testing attestation statement *	Summary of test results including any necessary calculations

**** More information on the following slides.***

Conduct Pre-Application Activities

Aerodynamic Testing

Test Options

Certifying Trailer Model Years	Test Procedure Options	Options for Standard Tractor
2018-2020	SmartWay 2014 Coastdown or Wind Tunnel Protocols Only	Recent Model Year SmartWay Designated Tractor
2018-2020	40 CFR 1037.526	Model resembles tractors in common commercial use with Bin III or better performance
2018+	40 CFR 1037.526	Model of a tractor that has been certified at Bin III or better, or actual tractor if coastdown is used

Conduct Pre-Application Activities

Aerodynamic Testing: Standard Tractor

- For Phase 2 test procedures (non-SmartWay): Measure CdA using a standard tractor meeting the requirements of 40 CFR 1037.501(h) which can include a model of a certified standard tractor.
- EPA will allow the use of models of non-certified tractors for Phase 2 testing of aerodynamic trailer devices through model year 2020.
- Such models should have a shape and features resembling those of tractors in common commercial use, and have aerodynamic performance equivalent to Bin III or better.
- Guidance Letter will be released soon

Conduct Pre-Application Activities

Aerodynamic Testing: SmartWay

- All test results must be submitted as $\Delta C_d A$
 - SmartWay coastdown results are obtained at zero yaw and need not be wind-averaged values.
 - Calculate $\Delta C_d A$ using the near-zero yaw results from the coastdown tests of the baseline and improved aero configurations ($\Delta C_d A = C_d A_{\text{base}} - C_d A_{\text{improve}}$)
 - SmartWay wind tunnel test results must be converted to wind-averaged drag area
 - Using a 4th order polynomial curve fit equation, calculate the $C_d A$ value at both +4.5 and -4.5 yaw angles for both A (baseline) and B (improved) test configurations
 - Calculate the average of the $C_d A$ values at -4.5 and +4.5 yaw for both A and B test configurations
 - Subtract the average $C_d A$ of the improved aero configuration ($C_d A_{\text{improve}}$) from the baseline configuration ($C_d A_{\text{base}}$) to calculate the change in $C_d A$: $\Delta C_d A = C_d A_{\text{base}} - C_d A_{\text{improve}}$

Conduct Pre-Application Activities

Aerodynamic Testing

- Equations showing a 4th order curve fit are in the regulations:

- Equation 1037.305-1 (under tractor testing)

$$C_d A_{alt}(\psi) = a_0 + a_1 \cdot \psi_{alt} + a_2 \cdot \psi_{alt}^2 + a_3 \cdot \psi_{alt}^3 + a_4 \cdot \psi_{alt}^4$$

- Equation 1037.534-7 (under alternate drag area procedures)

$$C_d A = C_d A_{ZeroYaw} + a_1 \cdot \bar{\psi}_{air} + a_2 \cdot \bar{\psi}_{air}^2 + a_3 \cdot \bar{\psi}_{air}^3 + a_4 \cdot \bar{\psi}_{air}^4$$

- Either of these equations are appropriate to follow because they accomplish the objective of calculating $C_d A$ at $\pm 4.5^\circ$ from a range of yaw angle data.

Conduct Pre-Application Activities

Aerodynamic Bins

- Aerodynamic bins help account for uncertainties in testing and reduce test burden
- Preliminary approvals of aero test data do not involve assigning any bins
 - **Each approval letter will identify the device's $\Delta C_d A$ value**
- Trailer manufacturers will choose an appropriate bin for certification based on the test results of all devices used with a trailer configuration
 - Trailer manufacturers may apply approved data from multiple devices in combination (40 CFR 1037.526(c))

Table 2 of § 1037.515—Bin Determinations for Trailers Based on Aerodynamic Test Results
($\Delta C_d A$ in m^2)

If a trailer's measured $\Delta C_d A$ is ...	designate the trailer as ...	and use the following value for $\Delta C_d A$
≤ 0.09	Bin I	0.0
0.10 – 0.39	Bin II	0.1
0.40 – 0.69	Bin III	0.4
0.70 – 0.99	Bin IV	0.7
1.00 – 1.39	Bin V	1.0
1.40 – 1.79	Bin VI	1.4
> 1.80	Bin VII	1.8

Request Elements: Attestation Statement

- Include a statement attesting that testing was conducted properly
- The aerodynamic performance data for the device(s) described in this document are based on testing at [*insert name, location of test facility*]. The tests were completed in accordance with methods specified in [*insert regulation and test method*].

Request Elements: Warranty

- Include a copy of the emissions warranty statement provided to the ultimate purchaser of the trailer
- Warranty period:
 - 5 years for aerodynamic devices that are included in the certified configuration
 - See 40 CFR 1037.120(b)(iii)

Request Elements: Maintenance Instructions

- If applicable, provide a copy of any maintenance instructions provided to the ultimate purchaser of the trailer
- Explain the owner's responsibility for proper maintenance in the owners manual
 - Include instructions that will enable the owner to maintain devices so that the vehicle continues to conform to the original certified vehicle configuration (See 40 CFR 1037.125)
 - Trailer useful life is 10 years (See 40 CFR 1037.107(c))

EPA Review and Approval Process

- EPA certification staff will review your materials
 - We will work with you to help make sure the request is complete.
 - We may ask for additional information.
- When all regulatory requirements are satisfied, we will issue an approval letter
 - The approval letter will be e-mailed to the company contact designated as *Program Manager* in the Maintain Manufacturer Information module
 - It will include a 14-character device ID number that may be used by trailer manufacturers when identifying selected devices at the time of certification
- Approvals based on SmartWay will be valid until December 31, 2020.
- Approvals using Phase 2 procedures will be valid unless/until amended or revoked.

EPA Review and Approval

Other Conditions of Approvals

- Recordkeeping
 - Maintain records for 8 years of records documenting measured aerodynamic performance of approved devices
- Recalls
 - We may ask you to recall nonconforming products under 40 CFR 1068.505.
- EPA Testing
 - We may request your device to conduct our own testing.
- Revocation
 - We may revoke an approval if the terms and conditions aren't met.

EPA Review and Approval

Post-Approval Changes

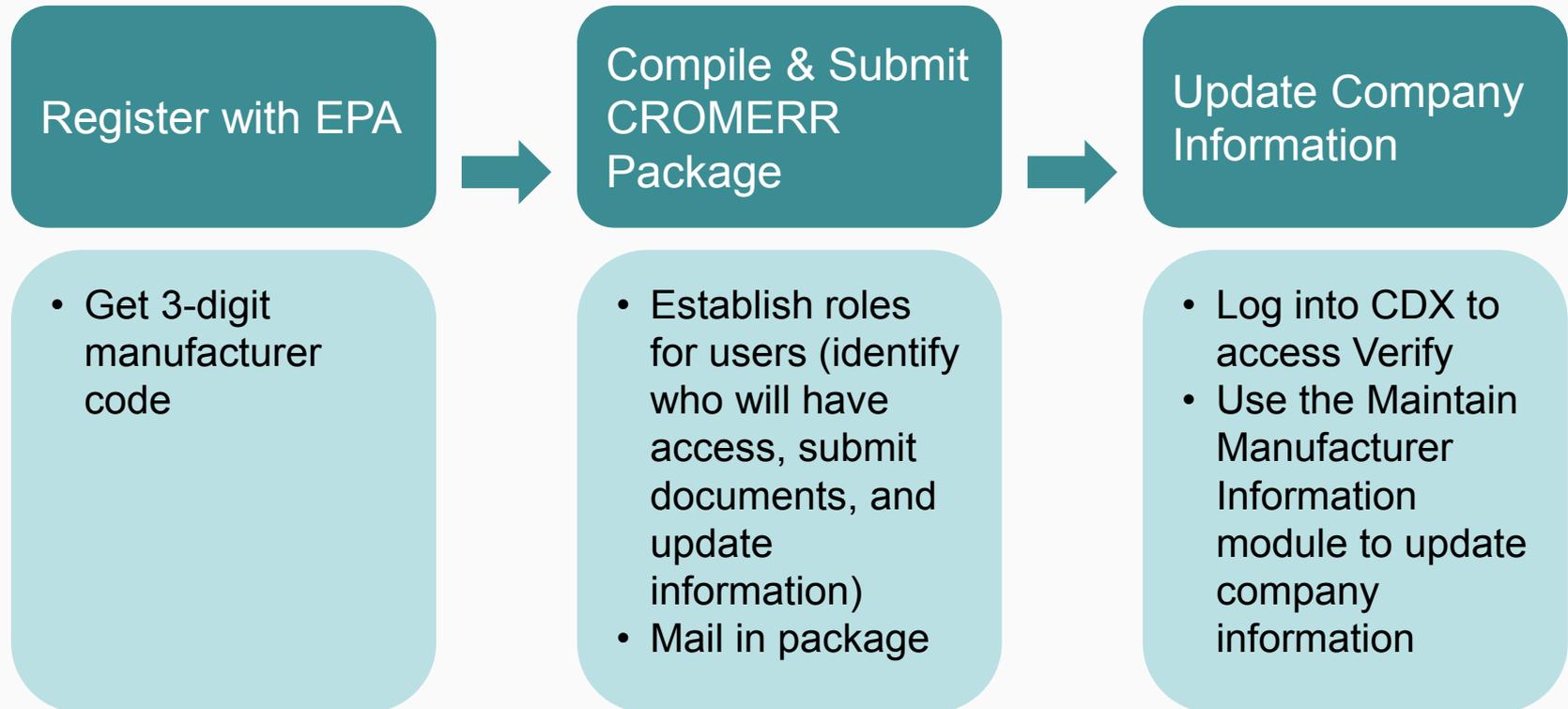
- Post-Approval Changes are changes to components or other changes that would make the emissions inconsistent with the information in your application (See 40 CFR 1037.225)
 - If you make design changes to devices, they may not be covered by an existing approval.
- We may issue approvals based on a range of products in a group with similar emissions characteristics.
- Revision process is same as for new Request for Approval
 - If you are uncertain whether you need to request a new approval, email complianceinfo@epa.gov



VERIFY INFORMATION

Process Overview

Account Setup Process



Register with EPA and Establish Verify Users

Verify is the information system that manufacturers use to submit certification and compliance information to EPA

- There are two parts to obtain access to Verify
 - Part 1: Company registration
 - Obtain a 3-character manufacturer code
 - Go to <https://www.epa.gov/vehicle-and-engine-certification/company-registration-verify-system> for instructions
 - Part 2: Account setup
 - Establish Verify users
 - Go to <https://www.epa.gov/vehicle-and-engine-certification/account-setup-verify-system> for instructions

Certification Roles for Each Company

Role	Associated Actions
Company Authorizing Official (CAO)	Identifies, vouches for, and manages the Verify Users
Maintain Manufacturer Information	Provides updates to industries, addresses, contacts, test labs and other manufacturer information
Upload Compliance Documents	Submits compliance documents
Industry Roles (Verify Submitter for every applicable industry)	Submits certification datasets and documents

Establishing Verify User Accounts

Establish a Company Authorizing Official (CAO)

- To establish a CAO you must submit:
 - Sponsor letter for the Verify CAO
 - Electronic Signature Agreement (ESA) for the Verify CAO
 - Verify User Registration Information spreadsheet
- Links to templates can be found here:
 - CAO Sponsor letter: <https://www.epa.gov/vehicle-and-engine-certification/sponsor-letter-verify-company-authorizing-official-cao>
 - CAO ESA: <https://www.epa.gov/vehicle-and-engine-certification/electronic-signature-agreement-esa-verify-company-authorizing>
 - User Registration Spreadsheet: <https://www.epa.gov/vehicle-and-engine-certification/information-spreadsheet-verify-user-registration>

Establishing Verify User Accounts

Establish Verify User(s)

- To establish Verify User(s) you must submit:
 - Sponsor letter
 - Signed by CAO to identify Verify Users
 - Verify User Registration Information spreadsheet
- Links to templates can be found here:
 - Verify User Sponsor Letter: <https://www.epa.gov/vehicle-and-engine-certification/sponsor-letter-verify-submitter-and-cromerr-signer>
 - User Registration Spreadsheet: <https://www.epa.gov/vehicle-and-engine-certification/information-spreadsheet-verify-user-registration>

Establishing Verify User Accounts

- Use this check list as a guide when putting together your package
 - <https://www.epa.gov/vehicle-and-engine-certification/checklist-verify-registration-package>
- Mail complete hard-copy CROMERR documentation to:
 - Verify Team
 - c/o CGI Federal, Inc.
 - 12601 Fair Lakes Circle
 - Fairfax, VA 22033
- Once approved, each user will receive an email with instructions for finalizing their registration and a link to access their CDX accounts.
- Questions regarding registration can be sent to:
 - verifydpc@epacdx.net

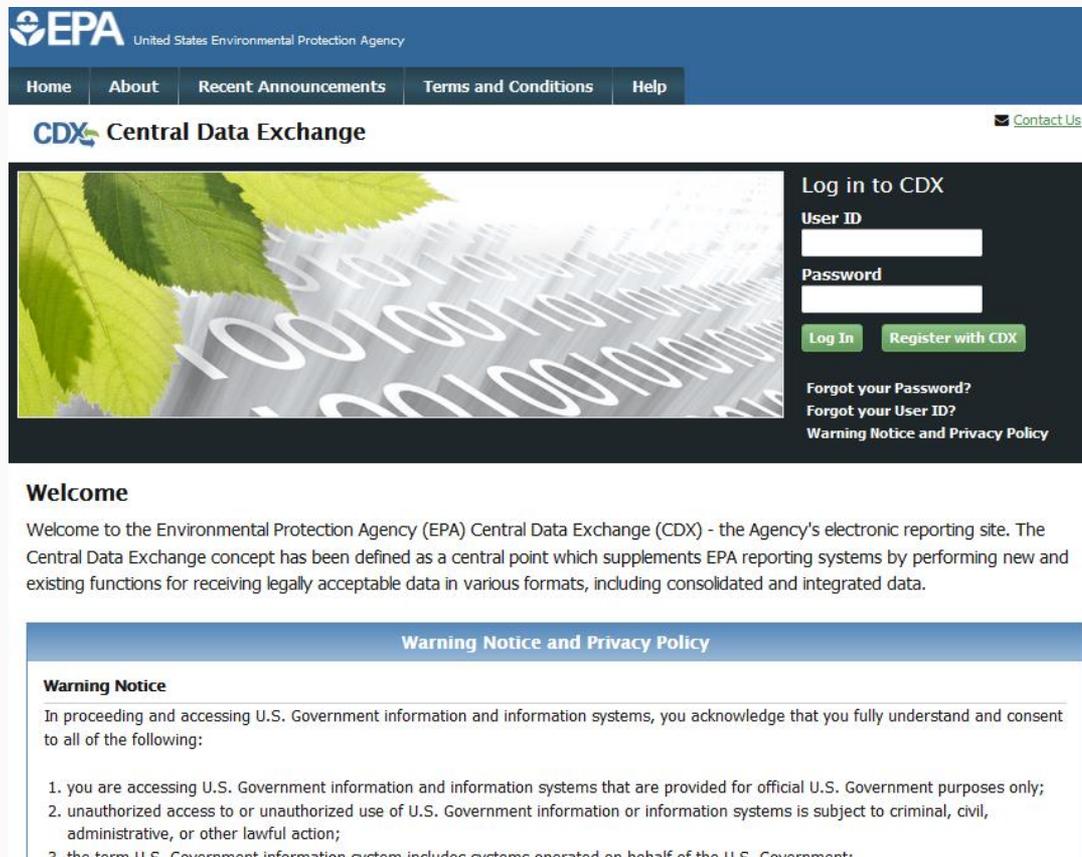


VERIFY DEMONSTRATION

Update Company Information

Log Into CDX to Access Verify

- New users will obtain a URL to the CDX system in their authorization email



EPA United States Environmental Protection Agency

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CDX Central Data Exchange [Contact Us](#)

Log in to CDX

User ID

Password

[Log In](#) [Register with CDX](#)

[Forgot your Password?](#)
[Forgot your User ID?](#)
[Warning Notice and Privacy Policy](#)

Welcome

Welcome to the Environmental Protection Agency (EPA) Central Data Exchange (CDX) - the Agency's electronic reporting site. The Central Data Exchange concept has been defined as a central point which supplements EPA reporting systems by performing new and existing functions for receiving legally acceptable data in various formats, including consolidated and integrated data.

Warning Notice and Privacy Policy

Warning Notice

In proceeding and accessing U.S. Government information and information systems, you acknowledge that you fully understand and consent to all of the following:

1. you are accessing U.S. Government information and information systems that are provided for official U.S. Government purposes only;
2. unauthorized access to or unauthorized use of U.S. Government information or information systems is subject to criminal, civil, administrative, or other lawful action;
3. the term U.S. Government information system includes systems operated on behalf of the U.S. Government:

Update Company Information

- EPA certification engineers rely on the company information in the Verify/CDX database
- Once a company has access, they are responsible for keeping all of the information in Verify's "Maintain Manufacturer Information" module complete and up-to-date
 - Add any new or missing industries, addresses, contacts, test labs, notification emails, etc.
 - Inactivate any obsolete addresses, contacts, test labs, etc.
- By default, all Verify users can "View Manufacturer Information" for their Manufacturer
 - A separate Verify role is needed for "Maintain Manufacturer Information"
 - Each company should have at least one user assigned the "Maintain Manufacturer Information" role to be able to update their company information

Update Company Information

Manufacturer Information

The “Heavy-Duty Highway Trailer” industry sector must be selected on this tab in order to submit trailer aero device approval requests

Maintain Manufacturer Profile

* = required field

+ = CTRL-click to select multiple values

Help

Manufacturer

Addresses

Contact Information

Notification Emails

Test Labs

Divisions (Light-Duty Only)

Alternate Manufacturers

EPA Compliance Representatives

Manufacturer Information

Industries*

Please include all applicable industries for which you will be requesting a certificate of conformity from EPA.
For each selected industry, please include the first model year you expect to request a certificate.

- | | | | |
|-------------------------------------|--|------------------|--------|
| <input type="checkbox"/> | Aircraft | First Model Year | 2008 |
| <input type="checkbox"/> | All Terrain Vehicle | First Model Year | 2009 |
| <input type="checkbox"/> | Alternative Fuel Converter (LDV/LDT/HDV Chassis Certified) | First Model Year | 2010 |
| <input type="checkbox"/> | Complete Heavy-Duty Highway Vehicle | First Model Year | 2009 |
| <input type="checkbox"/> | Electric Motorcycle | First Model Year | Select |
| <input type="checkbox"/> | Heavy-Duty Highway Clean Fuel Fleet | First Model Year | Select |
| <input type="checkbox"/> | Heavy-Duty Highway Gas and Diesel Engines | First Model Year | 2009 |
| <input type="checkbox"/> | Heavy-Duty Highway Evaporative | First Model Year | 2009 |
| <input type="checkbox"/> | Heavy-Duty Highway Tractors & Vocational Vehicles | First Model Year | 2009 |
| <input checked="" type="checkbox"/> | Heavy-Duty Highway Trailer | First Model Year | 2017 |

Update Company Information Addresses

All company addresses must be entered on this tab in order to submit requests for device approval

Maintain Manufacturer Profile

* = required field
+ = CTRL-click to select multiple values

[Help](#)

Manufacturer **Addresses** **Contact Information** **Notification Emails** **Test Labs** **Divisions (Light-Duty Only)** **Alternate Manufacturers** **EPA Compliance Representatives**

Company Address Information

Address #6

Address Label *	<input type="text"/>	Example: Company Headquarters
Address, First Line *	<input type="text"/>	
Address, Second Line	<input type="text"/>	
Address, Third Line	<input type="text"/>	
Address, Fourth Line	<input type="text"/>	
City *	<input type="text"/>	Country * <input type="text" value="Select"/>
State	<input type="text" value="Select"/>	Zip Code <input type="text"/>
State/Province *	<input type="text"/>	Postal Code * <input type="text"/>
Active/Inactive Status *	<input type="text" value="Active"/>	

Update Company Information

Contact Information

All company contacts, including a Program Manager, must be entered on this tab with the applicable industry selected for each contact

Maintain Manufacturer Profile

* = required field

+ = CTRL-click to select multiple values

Help

- Manufacturer
- Addresses
- Contact Information
- Notification Emails
- Test Labs
- Divisions (Light-Duty Only)
- Alternate Manufacturers
- EPA Compliance Representatives

Company Contact Information

Company Contact #1

Prefix	Select ▾	Title	<input type="text"/>
First Name *	<input type="text" value="Karen"/>	Middle Initial	<input type="text"/>
Last Name *	<input type="text" value="Danzeisen"/>	Suffix	Select ▾
Contact Role *	<input type="text" value="Program Manager"/>	Contact Role, If Other	<input type="text"/>
Active/Inactive Status *	Active ▾		

Contact Industry/Compliance Programs

Industry*	Compliance Program(s)*	
<input type="text" value="Heavy-Duty Highway Trailer"/>	All Certification Confirmatory Test	Delete

Add Additional Industry/Compliance Program(s)

Update Company Information

Test Labs

Test lab information is needed for entities submitting aerodynamic test data

Maintain Manufacturer Profile

* = required field

+ = CTRL-click to select multiple values

Help

Manufacturer

Addresses

Contact
Information

Notification
Emails

Test Labs

Divisions
(Light-Duty Only)

Alternate
Manufacturers

EPA Compliance
Representatives

Manufacturer Test Labs

Verify Test Lab ID 1

Is this test lab owned by another manufacturer? *

No

Active/Inactive Status *

Active

Test Lab Description

Test Lab Name *

LOD

Test Lab Address *

NVFEL- Lab Building, 2565 Plymouth Rd, Ann Arbor, MI

Add New Address

High Altitude? *

No

Number of Analyst Sites *

2

Number of Climate Chambers *

1

Number of Dynos/Sheds/Test Sites *

4

Test Lab Reference

Upload Compliance Documents

Combine all information for your request for device approval into one electronic file

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CDX Central Data Exchange

MyCDX Inbox My Profile Submission History

Services		Manage
Status	Program Service Name	Role
	VERIFY: Vehicles and Engines Compliance Information System	Upload Compliance Documents
	VERIFY: Vehicles and Engines Compliance Information System	View Manufacturer Information

Upload Compliance Documents

Select an Industry of “Heavy-Duty Highway Trailer”
Select a Compliance Document Type of “HD-GHG Aerodynamics Worksheet”

Upload EPA Compliance Documents From Manufacturer Workstation

MyCDX > Upload EPA Compliance Documents Logged in as, DMOSES05. Manufacturer: EPA - EPA (Logout)

Note:
1. Required fields are marked with * and cannot be left blank.
2. Due to memory and file size constraints the total size of the file to be uploaded should not exceed 100MB.
3. + = CTRL-click to select multiple values

[Help](#)

EPA Manufacturer Code	
Document Path and File Name *	<input type="text"/> Browse...
Path and File Name of Same Document in Alternate Format	<input type="text"/> Browse...
Industry * +	<div style="border: 1px solid gray; padding: 2px;"><ul style="list-style-type: none">Heavy-Duty Highway EvaporativeHeavy-Duty Highway Tractors & Vocational Vehicles<li style="background-color: #0070C0; color: white;">Heavy-Duty Highway TrailerHighway MotorcycleICI</div>
Compliance Document Type *	<div style="border: 1px solid gray; padding: 2px;">HD-GHG Aerodynamics Worksheet ▼</div>
Compliance Document Type, if "Other"	<input type="text"/>
General Document Type	Select ▼
General Document Type, if "Other"	<input type="text"/>
Compliance Document Topic	▼
Compliance Document Topic, if "Other"	<input type="text"/>
Confidentiality Status *	Select ▼
Document Applicability *	Select ▼
Does this document apply to one/multiple specific model year(s)? *	Select ▼
Model Year +	2022 ^ 2021

Upload Compliance Documents

Review & Submit when you are ready to complete your request.

Compliance Document Type *	HD-GHG Aerodynamics Worksheet
Compliance Document Type, if "Other"	
General Document Type	Select
General Document Type, if "Other"	
Compliance Document Topic	
Compliance Document Topic, if "Other"	
Confidentiality Status *	Select
Document Applicability *	Select
Does this document apply to one/multiple specific model year(s)? *	Select
Model Year *	2022 2021 2020
Document Date *	select
Title *	
Abstract *	
Keyword(s) *	Absorber Air cooled Alternative Fuel Alternative Fuel Converter CARB
Document Owner	Select (Select a contact from the list to populate the Document Owner fields below)
Document Owner Name *	
Document Owner Phone *	
Document Owner E-Mail *	
Comments	

Refresh

Review & Submit



CONTACTS & MORE INFORMATION

Sign Up for List servers

Stay current with compliance updates

- Subscribe to the Verify list server
 - Receive status updates on system developments and outages
 - Receive information on upcoming webinars
 - Interested manufacturers should subscribe by sending an email to verify@epa.gov that includes the email address(es) to be added to the list server.
- Subscribe to the Guidance Letters list server
 - Get notified when new guidance letters are available
 - Interested manufacturers should subscribe by following instructions at this link: <https://www.epa.gov/vehicle-and-engine-certification/guidance-letters-and-advisory-circulars-vehicle-engine-and#receiving-notice> or you may send an email to complianceinfo@epa.gov.

Contacts & More Information

- A copy of this presentation will be available on the Compliance Division's web page
 - <https://www.epa.gov/vehicle-and-engine-certification/certification-heavy-duty-hd-commercial-trucks-and-buses-and-onroad>
- Email inquiries to
 - complianceinfo@epa.gov