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 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

Request Aero Device Approval

- Conduct pre-application activities
- Electronically submit all information needed for a complete application as one document through Verify

EPA Review and Approval

- EPA will assign a unique Device Approval Number
- EPA will issue an approval letter (may have an expiration date)

Trailer Manufacturer Specifies Use of Device

- Include Device Approval Number in Request for Trailer Certificate
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:

<table>
<thead>
<tr>
<th>Manufacturer code</th>
<th>Installation instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer name &amp; address</td>
<td>Warranty statement *</td>
</tr>
<tr>
<td>Date of request</td>
<td>Maintenance instructions *</td>
</tr>
<tr>
<td>Device model/trade name</td>
<td>Name/address of test facility</td>
</tr>
<tr>
<td>Device description, including single or package</td>
<td>SmartWay verification letter (if applicable)</td>
</tr>
<tr>
<td>Incompatibilities with other devices</td>
<td>Delta CdA, in m², to 2 decimal places</td>
</tr>
<tr>
<td>Suitable trailer subcategories</td>
<td>If also trailer OEM, commercial availability</td>
</tr>
<tr>
<td>Description of testing facility and test protocol</td>
<td>Description of the standard tractor and its aerodynamic performance level</td>
</tr>
<tr>
<td>Component part numbers</td>
<td>Description of the tested trailer, both as baseline “A” and with improvements “B”</td>
</tr>
<tr>
<td>Testing attestation statement *</td>
<td>Summary of test results including any necessary calculations</td>
</tr>
</tbody>
</table>

* More information on the following slides.
## Test Options

<table>
<thead>
<tr>
<th>Certifying Trailer Model Years</th>
<th>Test Procedure Options</th>
<th>Options for Standard Tractor</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018-2020</td>
<td>SmartWay 2014 Coastdown or Wind Tunnel Protocols Only</td>
<td>Recent Model Year SmartWay Designated Tractor</td>
</tr>
<tr>
<td>2018-2020</td>
<td>40 CFR 1037.526</td>
<td>Model resembles tractors in common commercial use with Bin III or better performance</td>
</tr>
<tr>
<td>2018+</td>
<td>40 CFR 1037.526</td>
<td>Model of a tractor that has been certified at Bin III or better, or actual tractor if coastdown is used</td>
</tr>
</tbody>
</table>
• 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
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 $C_d A$: $\Delta C_d A = C_d A_{\text{base}} - C_d A_{\text{improve}}$
Equations showing a 4\textsuperscript{th} order curve fit are in the regulations:

- Equation 1037.305-1 (under tractor testing)
  \[ C_d A_{\text{alt}}(\psi) = a_0 + a_1 \cdot \psi_{\text{alt}} + a_2 \cdot \psi_{\text{alt}}^2 + a_3 \cdot \psi_{\text{alt}}^3 + a_4 \cdot \psi_{\text{alt}}^4 \]

- Equation 1037.534-7 (under alternate drag area procedures)
  \[ C_d A = C_d A_{\text{ZeroYaw}} + a_1 \cdot \overline{\psi}_{\text{air}} + a_2 \cdot \overline{\psi}_{\text{air}}^2 + a_3 \cdot \overline{\psi}_{\text{air}}^3 + a_4 \cdot \overline{\psi}_{\text{air}}^4 \]

Either of these equations are appropriate to follow because they accomplish the objective of calculating \( C_d A \) at ±4.5° 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 $\Delta C_{dA}$ 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>
<thead>
<tr>
<th>$\Delta C_{dA}$ (in m²)</th>
<th>Bin Designation</th>
<th>$\Delta C_{dA}$ Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 0.09</td>
<td>Bin I</td>
<td>0.0</td>
</tr>
<tr>
<td>0.10 – 0.39</td>
<td>Bin II</td>
<td>0.1</td>
</tr>
<tr>
<td>0.40 – 0.69</td>
<td>Bin III</td>
<td>0.4</td>
</tr>
<tr>
<td>0.70 – 0.99</td>
<td>Bin IV</td>
<td>0.7</td>
</tr>
<tr>
<td>1.00 – 1.39</td>
<td>Bin V</td>
<td>1.0</td>
</tr>
<tr>
<td>1.40 – 1.79</td>
<td>Bin VI</td>
<td>1.4</td>
</tr>
<tr>
<td>&gt; 1.80</td>
<td>Bin VII</td>
<td>1.8</td>
</tr>
</tbody>
</table>
• 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].
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 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.
• 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
- Get 3-digit manufacturer code

Compile & Submit CROMERR Package
- Establish roles for users (identify who will have access, submit documents, and update information)
- Mail in package

Update Company Information
- Log into CDX to access Verify
- Use the Maintain Manufacturer Information module to update company information
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

<table>
<thead>
<tr>
<th>Role</th>
<th>Associated Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company Authorizing Official (CAO)</td>
<td>Identifies, vouches for, and manages the Verify Users</td>
</tr>
<tr>
<td>Maintain Manufacturer Information</td>
<td>Provides updates to industries, addresses, contacts, test labs and other manufacturer information</td>
</tr>
<tr>
<td>Upload Compliance Documents</td>
<td>Submits compliance documents</td>
</tr>
<tr>
<td>Industry Roles (VerifySubmitter for every applicable industry)</td>
<td>Submits certification datasets and documents</td>
</tr>
</tbody>
</table>
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:
  – 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:
  – 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

- 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](mailto: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
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.
The “Heavy-Duty Highway Trailer” industry sector must be selected on this tab in order to submit trailer aero device approval requests.
All company addresses must be entered on this tab in order to submit requests for device approval.
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.
Test lab information is needed for entities submitting aerodynamic test data
Combine all information for your request for device approval into one electronic file.

<table>
<thead>
<tr>
<th>Status</th>
<th>Program Service Name</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>VERIFY: Vehicles and Engines</strong></td>
<td><strong>Upload Compliance</strong></td>
</tr>
<tr>
<td></td>
<td>Compliance Information System</td>
<td><strong>Documents</strong></td>
</tr>
<tr>
<td></td>
<td><strong>VERIFY: Vehicles and Engines</strong></td>
<td><strong>View Manufacturer</strong></td>
</tr>
<tr>
<td></td>
<td>Compliance Information System</td>
<td><strong>Information</strong></td>
</tr>
</tbody>
</table>
Upload Compliance Documents

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

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

<table>
<thead>
<tr>
<th>Compliance Document Type</th>
<th>HD-QHG Aerodynamics Worksheet</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Document Type</td>
<td>Select</td>
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<tr>
<td>Compliance Document Topic</td>
<td>Select</td>
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<tr>
<td>Confidentiality Status</td>
<td>Select</td>
</tr>
<tr>
<td>Document Applicability</td>
<td>Select</td>
</tr>
<tr>
<td>Does this document apply to one/multiple specific model year(s)?</td>
<td>Select</td>
</tr>
<tr>
<td>Document Date</td>
<td>select</td>
</tr>
<tr>
<td>Title</td>
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<tr>
<td>Abstract</td>
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<td>Keyword(s)</td>
<td>Atsorber, Air cooled, Alternative Fuel, Alternative Fuel Converter, CAFIB</td>
</tr>
<tr>
<td>Document Owner</td>
<td>Select</td>
</tr>
</tbody>
</table>

(Select a contact from the list to populate the Document Owner fields below)

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

• Email inquiries to
  – complianceinfo@epa.gov