

 FIAT CHRYSLER AUTOMOBILES	SUPPLIER AECD DISCLOSURE REQUIREMENTS	CEP-A0782<E> Corporate Guidelines and Engineering Publications
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		Date: 15-APR-2020

REGIONAL DOCUMENT

Change level	Date	Description of change
-	23-MAY-2019	Initial release
A	19-FEB-2020	Sections 1, 2, 9.2, 9.4.2, 9.4.3, and 9.4.4 - Updated for clarity Section 3 - added two new terms: "ERP" and "PF-EMISSIONS<E>" Section 7 - Added requirement for supplier confirmation Section 7 - Added requirement to maintain AECD output device list Sections 9.6, 9.7, 9.8 - added an indicator to clarify information is required only for AECDs that reduce the effectiveness of the emission control system Updates to embedded AECD Disclosure template - Added supplier confirmation statement with signature lines and added an indicator to clarify information required only for AECDs that reduce the effectiveness of the emission control system Added Output List Template Section 7 - Added "properly calibrated" Updated Output List Template with two flowcharts
B	15-APR-2020	Section 9.4 – Added that all AECD inputs must have appropriate diagnostics

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SUPPLIER AECD DISCLOSURE REQUIREMENTS

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1 SCOPE

The purpose of this document is to communicate supplier requirements for documenting and disclosing Auxiliary Emission Control Devices (AECDs). This is applicable to emission related parts (ERP) / services that include controls, software, and/or calibrations for diagnostic or emission critical electronic control units (DEC ECU).

2 REFERENCES

Table 1 - References

Document Number	Shield/Designator (if applicable)	Document Title	downloadable for suppliers from beStandard
CFR§86.1803-01		Title 40: Protection of Environment, Code of Federal Regulations	N
CFR§86.1844-01(d)(11)		Title 40: Protection of Environment, Code of Federal Regulations	N
CFR§86.1809		Title 40: Protection of Environment, Code of Federal Regulations	N
PF-EMISSIONS	<E>	IDENTIFICATION OF EMISSIONS ITEMS	Y

3 DEFINITIONS/ABBREVIATIONS/ACRONYMS/SYMBOLS

AECD – Auxiliary Emission Control Device

AES – Auxiliary Emission Strategy

BES – Base Emission Strategy

CAN – Controller Area Network

CARB – California Air Resource Board

CFR – Code of Federal Regulation

DEC ECU - Diagnostic or Emission Critical Electronic Control Unit

ECU – Electronic Control Unit

EOM – Engine Operating Mode

EPA – Environmental Protection Agency

ERP – Emission Related Part – an FCA US list of parts identified as affecting emissions system performance described in PF-EMISSIONS<E>

FCA – Fiat Chrysler Automobiles

FTP – Federal Test Procedure

HWFET - Highway Fuel Economy Test

LMS – Learning Management System

NEDC – New European Driving Cycle

PF-EMISSIONS<E> – A Performance (PF) Engineering Standard which applies to product Emissions parts or functions that are important in complying with government regulations covering the control of air pollution from new motor vehicles and engines.

SOF – Start of Frame

WLTP – Worldwide Harmonized Light Vehicle Test Procedure

4 REGULATED SUBSTANCES & RECYCLABILITY

Not Applicable

5 REGULATORY DEFINITIONS

- Defeat Device (40 CFR §86.1803-01):
An auxiliary emission control device (AECD) that reduces the effectiveness of the emission control system under conditions which may reasonably be expected to be encountered in normal vehicle operation and use, unless:
 - 1) Such conditions are substantially included in the Federal emission test procedure;
 - 2) The need for the AECD is justified in terms of protecting the vehicle against damage or accident;
 - 3) The AECD does not go beyond the requirements of engine starting; or
 - 4) The AECD applies only for *emergency vehicles* and the need is justified in terms of preventing the vehicle from losing speed, torque, or power due to abnormal conditions of the emission control system, or in terms of preventing such abnormal conditions from occurring, during operation related to emergency response. Examples of such abnormal conditions may include excessive exhaust backpressure from an overloaded particulate trap, and running out of diesel exhaust fluid for engines that rely on urea-based selective catalytic reduction.
- Auxiliary Emission Control Device (AECD) (40 CFR §86.1803-01):
Any element of design that senses temperature, vehicle speed, engine RPM, transmission gear, or any other parameter for the purpose of activating, deactivating, or modulating the operation of any part of the emission control system.
- AECDs are required to be disclosed as part of the Part 1 application of an emissions certificate of conformity (40 CFR 86.1844(d)11-01), as follows:
A list of all auxiliary emission control devices (AECD) installed on any applicable vehicles, including a justification for each AECD, the parameters they sense and control, a detailed justification of each AECD that results in a reduction in effectiveness of the emission control system, and rationale for why it is not a defeat device as defined under § 86.1809. The following specific provisions apply for AECDs:
 - i. For any AECD uniquely used at high altitudes, EPA may request engineering emission data to quantify any emission impact and validity of the AECD.
 - ii. For any AECD uniquely used on multi-fuel vehicles when operated on fuels other than gasoline, EPA may request engineering emission data to quantify any emission impact and validity of the AECD.
 - iii. For Tier 3 vehicles with spark-ignition engines, describe how AECDs are designed to comply with the requirements of § 86.1811-17(d). Identify which components need protection through enrichment strategies; describe the temperature limitations for those components; and describe how the enrichment strategy corresponds to those temperature limitations. We may also require manufacturers to submit this information for certification related to Tier 2 vehicles.

6 TRAINING REQUIREMENT

Any supplier employee, agent or contractor who supports FCA vehicles or programs in the following areas must complete the Defeat Device Awareness and Prevention web course:

- System controls;

- Engine/transmission software;
- Calibration;
- Emissions testing;
- Emissions-related hardware; and
- Any other areas where employees could impact the disclosure or implementation of an AECD, AES, BES, or defeat device.

In order for supplier employees, agents or contractors to complete the Defeat Device Awareness and Prevention web course, suppliers will need to download the web course file from FCA and host the course on their internal company Learning Management System (LMS). To get the web course file from FCA, please send an email to **vehicle_safety@fcagroup.com** and ask for the Defeat Device Awareness and Prevention training. When suppliers receive the file, they will be responsible for creating awareness of the web course, emphasizing its importance, and ensuring it is completed by their employees, agents, and contractors who support FCA vehicles or programs in the areas listed above. As part of the training process, suppliers will be asked to certify that their employees have completed this training. Instructions on how to certify will be provided by the FCA Vehicle Safety team when the supplier requests access to the web course file.

7 AECD DISCLOSURE REQUIREMENTS

Suppliers are required to confirm to FCA that they have disclosed and accurately described all AECDs, AESs, and BESs that are associated with their emission-related parts or services, and that supplier goods do not contain Defeat Devices. Reporting AECDs is required by regulation as part of the vehicle certification process. Failure to report AECDs can result in features being considered Defeat Devices by the EPA or CARB. The EPA will not certify for sale vehicles equipped with Defeat Devices. FCA requires AECDs to be reported to FCA's emissions certification department for review and approval, and requires disclosure of features that control output devices that are hard wired, or controlled via CAN, LIN, or any other communication protocol. A list of all output devices needs to be maintained, with documentation of whether or not, when functioning properly and properly calibrated, each output device could possibly affect tailpipe emissions, evaporative emissions, or greenhouse gases. Once approved, FCA emissions certification then discloses the AECDs to the EPA and CARB. FCA will reject controls/software and calibrations that are not thoroughly and properly documented by the supplier. Suppliers shall disclose required AECD information and output devices to FCA in the following reporting formats:



Supplier AECD
Disclosure Template-



Supplier Output
Device Template and

Refer to Section 9, below, for guidelines pertaining to the information required in the Supplier AECD Disclosure Template.

8 TIMING REQUIREMENT FOR DISCLOSING AECDs TO FCA

AECD submissions to FCA are due 36 weeks before V1 SOF. At the start of the project, as part of project management, a review cadence shall be established for the purpose of reviewing AECDs. It is required that AECDs are submitted throughout the development cycle, and not at the very end. All final submissions are due by 36 weeks before V1 SOF.

9 REQUIRED INFORMATION FOR AECD DISCLOSURE

9.1 AECD Feature Name and Number

Provide the name of the software feature. This needs to be described from the standpoint of how the feature can “reduce the effectiveness.” Example: If a feature reduces fuel to optimize emissions, the description in this column would be the DISABLEMENT of this feature. Assign a number for tracking purposes. The first AECD should be numbered “1”, the second AECD should be numbered “2” and so on.

9.2 Feature Revision History

Keep a history of revisions, including date, and comments. The revision history serves as a means to communicate and track changes of an AECD feature.

9.3 Feature Description and Purpose

This section is intended to fulfill the requirement to set forth “the justification for each AECD” under 40 CFR 86.1844-01 (d)(11); accordingly this section must provide a description of the AECD and its purpose, what the AECD does, and how it accomplishes its purpose.

9.4 Inputs

This section is intended to fulfill the requirement to set forth “the parameters [the AECD] sense[s]...” under 40 CFR 86.1844-01 (d)(11); accordingly, this section must list all parameters that are an input to the AECD. All inputs to the AECD must be OBD compliant and have appropriate diagnostics, including inputs received via a communication bus.

9.4.1 Direct Sensor Inputs – Descriptions

If the input is a direct output of a sensor, indicate that the input is a measured input, and describe the input according to a unit and scale consistent with what such sensor senses.

9.4.2 Direct Sensor Inputs - Implementation Names

Document the parameter implementation name for each direct sensor input listed in 9.4.1.

9.4.3 Calculated Parameter Input – Descriptions

If the input is a modeled input, indicate that the input is a modeled input, and describe the model and the input according to a unit and scale consistent with what such model calculates, and, if the model is itself an AECD, make reference to the AECD number in the disclosure document of which such modeled input is another disclosed AECD. Or, if the input is received by the ECU via CAN bus, indicate that the input is received via a communication bus, and describe the input according to a unit and scale consistent with that which is transmitted across the bus.

9.4.4 Calculated Parameter Inputs - Parameter Names

Document the parameter implementation name for each calculated input listed in 9.4.3.

9.5 Outputs

This section is intended to fulfill the requirement to set forth “the parameters [the AECD] ... control[s]” as required under 40 CFR 86.1844-01 (d)(11); accordingly this section must describe the ultimate parameter, hardware, software, operation, and/or quantity of the emission control system the AECD controls, and according to a unit and scale consistent with such parameter, hardware, software, operation, and/or quantity.

9.6 Operation Criteria – REQUIRED ONLY FOR AECDs THAT REDUCE THE EFFECTIVENESS OF THE EMISSION CONTROL SYSTEM

For activation, modulation, deactivation, and suspension criteria, set forth all information necessary to understand the operation of the AECD, including calibrations, inputs and outputs, what is controlled by it, and any other information deemed appropriate to include. This information shall be presented to FCA in the standard template (or other suitable database file format), enumerated and named identically to the same AECD described in text as indicated above, and electronically linked to such AECD text document. Such information shall contain the full list of calibration labels, arrays, values and maps that constitute the AECD. If the AECD’s control strategy has different calibrations depending on the engine operating mode (EOM), the above-referenced calibration information must be provided for each EOM.

9.6.1 Activation Criteria

This section must set forth only those input parameters that are necessary, once such inputs’ enabling conditions are met, to enable the AECD to become active, including the actual calibrated values of the enabling conditions. Feature is not activated until ALL criteria is met. Typical data types: scalars. Examples:

- 1) Accumulated Air > Threshold
- 2) Catalyst Temperature < Threshold

9.6.2 Modulation Criteria

Feature is modulated as a function of the listed parameters (0 is an accepted modulated value). Typical data types: scalars, 2D tables, 3D surfaces.

Examples:

- 1) Barometer: IN RANGE
- 2) ECT @ Start: IN RANGE

9.6.3 Deactivation Criteria

Feature exits permanently when one or more of the listed criteria is met; with NO possibility to “reactivate” the feature during the key cycle. Typical data types: scalars.

Examples:

- 1) RPM < Threshold
- 2) Accumulated Air > Threshold (cal’d out)

9.6.4 Suspension Criteria

Feature temporarily exits when the listed criteria is met, but controls will allow the possibility to “reactivate” the feature during they key cycle. Typical data types: Scalars.

Examples:

Pedal > Threshold
 Engine Position Pulse

9.7 AECD Justification – REQUIRED ONLY FOR AECDs THAT REDUCE THE EFFECTIVENESS OF THE EMISSION CONTROL SYSTEM

All statements in this section must be supported with data, evidence, or robust and convincing engineering judgement. This section is intended to fulfil the requirement to set forth the “[rationale] for why [the AECD] is not a defeat device as defined under [40 CFR] 86.1809” (for the avoidance of doubt, 40 CFR §86.1809 sets forth the general regulatory prohibition against defeat devices, whereas the term “defeat device” is defined at 40 CFR 86.1803 and in Section II of this SOW); accordingly, this section must set forth a description of the rationale as to why the subject AECD is not a defeat device, and if supplier states that the subject AECD reduces the effectiveness of the emission control system as measured at the tailpipe under certain driving conditions, supplier must state so, provide a detailed description of such driving conditions, and identify and state which one or more of the following bases for not being a defeat device supplier states is applicable to the subject AECD, under 40 CFR 86.1803-01:

- 1 Such conditions are substantially included in the Federal emission test procedure;
- 2 The need for the [subject] AECD is justified in terms of protecting the vehicle against damage or accident;
- 3 The [subject] AECD does not go beyond the requirements of engine starting.

Where supplier states that exception number 2 above is a rationale for why the subject AECD is not a defeat device, Supplier must further state which vehicle component the subject AECD is protecting, and how such damage or accident will occur without the existence and operation of the subject AECD.

If the AECD does not reduce the effectiveness of the emission control system at the tailpipe under conditions which may reasonably be expected to be encountered in normal vehicle operation and use, supplier must state as such, explain why it does not reduce the effectiveness of the emission control system at the tailpipe, and state that as the basis for the AECD not being a defeat device.

9.8 Interaction with other AECDs – REQUIRED ONLY FOR AECDs THAT REDUCE THE EFFECTIVENESS OF THE EMISSION CONTROL SYSTEM

All statements in this section must be supported with data, evidence, or robust and convincing engineering judgement. This section must, for conditions when the subject AECD is active, set forth by AECD name and number, of all other AECDs that exist in the subject disclosure document that are or can be active at the same time that the subject AECD is active. If such other AECDs operate to prevent the subject AECD (if it acted on its own) from reducing the effectiveness of the emission control system at the tailpipe, supplier must state as such and provide a comprehensive and thorough explanation of how such other AECDs prevent in the subject AECD from reducing the effectiveness of the emission control system at the tailpipe.

9.9 Expected Emissions Effect

All statements in this section must be supported with data, evidence, and/or robust and convincing engineering judgement. This section is intended to fulfill the requirements to set forth information applicable to “each AECD that results in a reduction in the effectiveness of the emission control system” at the tailpipe as required under 40 CFR 86.1844-01 (d)(11). This section must set forth whether or not the AECD’s operation has an effect or impact on tailpipe emissions of NMHC, CO, NOx, PM, or greenhouse gases, which of those substances are affected, and, for each such affected substance, whether due to the operation of the subject AECD or the cessation of the operation of the subject AECD tailpipe emissions increase, decrease, or remain unchanged. If the operation or cessation of operation of the subject AECD operating on its own would reduce the effectiveness of the emission control system at the tailpipe, but because one or more other AECD(s) operate(s) in tandem with the subject AECD such

that there is no reduction in the effectiveness of the emission control system, this section must (i) state as such, (ii) state generally how such other AECD(s) prevent the operation or cessation of the operation of the subject AECD from reducing the effectiveness of the emission control system as measured at the tailpipe, (iii) make reference to the AECD number(s) in the disclosure document of such other AECD(s), and (iv) state that the "Interaction With Other AECDs" section of the subject AECD disclosure will describe the operation of such other AECD(s) as relates to the subject AECD.

9.9.1 On Cycle

The feature, as described in the feature description and purpose, is active on one or more of the emission cycles. Please remember this could apply to the disablement of the feature. Identify ALL cycles the feature is substantially active on. Available options are below. Indicate all that apply.

- FTP 75 °F
- HWFET
- US06
- SC03
- FTP 50 °F
- FTP 20 °F
- Altitude FTP 75 °F
- Altitude FTP 20 °F
- NEDC
- WLTP
- 7 °F
- None

9.9.2 On Cycle Effect

Indicate the expected emission impact on the relevant cycles.

9.9.3 Off Cycle Description

Describe drive cycles where the feature will be active or may operate differently than it does on-cycle.

9.9.4 Off Cycle Effect

Indicate the expected emission impact on the relevant cycles during the off-cycle drive conditions.

9.10 Emissions Risk Assessment (only required for features that protect the hardware, vehicle, or customer) – REQUIRED FOR NON-NAFTA PROGRAMS ONLY

9.10.1 Emissions Risk Assessment Index

Number. Should be the defined as "Severity² * Occurrence" from below.

9.10.2 Emission Risk Assessment Notes

Is the level of protection justified as only the amount necessary to protect the hardware, vehicle, or customer and not more? Please explain how.

9.10.3 Emissions Severity Index

Select appropriate Severity Index number from [Figure 1](#) (below).



Severity

- Relative increase based on "application" standard tested (ex ULEV70 below)
- Assumption is that hardware selection is appropriate for emissions standard

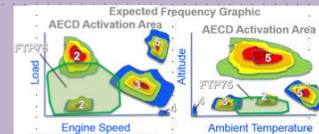
Severity Index	Relative Increase	NMOG+NOx (g/mi)		CO (g/mi)		PM (g/mi)		Description
		Min	Max	Min	Max	Min	Max	
1	0%	0.000	0.004	0.000	0.089	0.000	0.0004	No impact or better emissions in any constituent. Does not reduce the effectiveness of the emissions control system.
2	5%	0.004	0.0069	0.090	0.169	0.0005	0.0009	No measurable impact in any constituent (lost in test-to-test variation using Ratio95 2-σ statistical qualifier)**
3	10%	0.007	0.0109	0.170	0.259	0.001	0.0019	Increase non-criteria constituents only (FE, Evap, etc.)
4	15%	0.011	0.0139	0.260	0.339	0.002	0.0019	Slight EO increase, no measurable TP increase, trading constituents.
5	20%	0.014	0.020	0.340	0.509	0.002	0.002	Moderate EO increase, slight TP increase
6	30%	0.021	0.041	0.510	1.019	0.003	0.005	Emissions increase approximately at standard
7	60%	0.042	0.069	1.020	1.699	0.006	0.009	Emissions increase above standard
8	100%	0.070	0.139	1.700	3.399	0.010	0.019	Emissions increase - 1X standard
9	200%	0.140	0.209	3.400	5.099	0.020	0.029	Emissions increase - 2X standard
10	300%	0.210	>0.21	5.100	>5.1	0.030	>0.03	Emissions increase - 3X+ standard

Figure 1 - Severity Index



Occurrence

- Actual activation frequency relative to on-cycle activation frequency



Occurrence Index	Description	Example
1	Abnormal operation modes only	Inplant, transport, and service features
2	Occurs frequently on cycle / Substantially included on cycle	DFSO, ESS, MDS, etc.
3	Occurs infrequently both on cycle & off cycle	VVT chip cleaning, dog clutch misalignment
4	Does not occur on cycle, occurs off-cycle infrequently (< every key cycle)	Heater Warmup, Sus pending Cat Therm. Mngt
5	Does not occur on cycle, occurs off-cycle frequently (> every key cycle)	

Figure 2 - Occurrence Index

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