# Mercedes-Benz MY2022 A220 PEMS Report

## 1. Background

Daimler AG, with headquarters in Stuttgart, Germany, is a large automotive company that sells vehicles and services in nearly every country in the world. Daimler has production facilities in Europe, North and South America, Asia, and Africa. The current brand portfolio includes Mercedes-Benz as well as Mercedes-AMG, Mercedes-Maybach, smart, and EQ.

As part of fulfilling obligations under the Consent Decree entered on March 9, 2021 ("Consent Decree") with the United States and California, Daimler conducts off-cycle testing, encompassing Portable Emissions Measurement System (PEMS) testing, to demonstrate off-cycle tailpipe emissions and to screen for undisclosed auxiliary emission control devices (AECDs) and defeat devices in U.S. light- and medium-duty vehicles. The testing was conducted as described in Section VII of the Consent Decree. Pursuant to the Consent Decree, Daimler will conduct PEMS testing for any new diesel vehicles issued Certificates of Conformity or Executive Orders through and including MY2023 as light- or medium-duty diesel models, and for three vehicles certified as light- or medium-duty gasoline Test Groups per Model Year from MY2021 through and including MY2024. This PEMS report relates to MY2022 A220 from Test Group NMBXV02.0U3C, which is the second highest volume Test Group applicable for MY2022 based on the projected 50 states' sales volumes prepared for NMOG + NOx fleet averages under Tier 3.

## 2. Approach

To demonstrate off-cycle tailpipe emissions, tests were performed on public roads in the Los Angeles area on city, highway, and mountain routes. These test routes have been approved by CARB. Emissions measured and/or calculated and reported include oxides of nitrogen ($NO_x$), carbon monoxide (CO), carbon dioxide ($CO_2$), total hydrocarbons (THC), and non-methane organic gases (NMOG). All tests were executed by a team in Long Beach, CA. This team is independent of Daimler AG's and Mercedes-Benz AG's product development departments. All vehicles were configured and tested by MBRDNA Long Beach Compliance staff. Test results were then analyzed to ensure quality control processes took place before and after each test sequence, including instrument calibration and calibration with reference gasses.

## 3. Emissions Results

MY2022 vehicle with the specifications listed in Table 1 was tested in February 2021. Tables 2 through 4 provide the vehicle test results of the combined route segments performed in the default transmission mode (Comfort Mode).

**Table 1: Vehicle Specification**

| Model | Tier | Drive type | HP | Torque (ft.lb) | Transmission | Exh Treatment | Fuel | Start Mileage |
|---|---|---|---|---|---|---|---|---|
| A220 | ULEV70 | FWD | 188 | 221 | 7 - DCT | TWC | Gasoline | 42 |

**Table 2: Highway Results**

| | A1 Highway East (g/mi) | | | | | B2 Highway West (g/mi) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Model** | **$CO_2$** | **CO** | **THC** | **$NO_X$** | **NMOG** | **$CO_2$** | **CO** | **THC** | **$NO_X$** | **NMOG** |
| A220 | 257.18 | 0.36784 | 0.00880 | 0.01582 | 0.00619 | 204.52 | 0.26296 | 0.00362 | 0.01004 | 0.00298 |

**Table 3: Mountain Results**

| | A2 Mountain Uphill (g/mi) | | | | | B1 Mountain Downhill (g/mi) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Model** | **$CO_2$** | **CO** | **THC** | **$NO_X$** | **NMOG** | **$CO_2$** | **CO** | **THC** | **$NO_X$** | **NMOG** |
| A220 | 470.34 | 0.78949 | 0.02033 | 0.02569 | 0.01241 | 164.60 | 0.17744 | 0.00993 | 0.01099 | 0.00641 |

**Table 4: Cold Start and Urban Driving Result**

| | A0 Long Beach → CARB (g/mi) | | | | | LA City (g/mi) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Model** | **$CO_2$** | **CO** | **THC** | **$NO_X$** | **NMOG** | **$CO_2$** | **CO** | **THC** | **$NO_X$** | **NMOG** |
| A220 | 248.56 | 0.30019 | 0.02583 | 0.02016 | 0.02046 | 366.13 | 0.38789 | 0.00110 | 0.02388 | 0.00155 |

## 4. Trip Statistics

Tables 5 to 10 summarize the vehicle test statistics and environmental conditions during each test cycle.

**Table 5: Highway East (A1)**

| Trip Duration h.mm.ss | Distance (mi) | V*Apos‡ | Average Speed (mi/h) | Standstill % | Constant % | Acceleration % | Deceleration % | Cumulative pos. altitude (m) | Average temperature (F) |
|---|---|---|---|---|---|---|---|---|---|
| 0.40.34 | 27.62 | 12.428 | 40.85 | 18.69 | 0.12 | 42.77 | 38.41 | 430.10 | 71.40 |

**Table 6: Highway West (B2)**

| Trip Duration h.mm.ss | Distance (mi) | V*Apos‡ | Average Speed (mi/h) | Standstill % | Constant % | Acceleration % | Deceleration % | Cumulative pos. altitude (m) | Average temperature (F) |
|---|---|---|---|---|---|---|---|---|---|
| 0.33.26 | 28.26 | 14.451 | 50.71 | 8.08 | 0.20 | 46.81 | 44.92 | 197.85 | 72.01 |

**Table 7: Mountain Uphill (A2)**

| Trip Duration h.mm.ss | Distance (mi) | V*Apos‡ | Average Speed (mi/h) | Standstill % | Constant % | Acceleration % | Deceleration % | Cumulative pos. altitude (m) | Average temperature (F) |
|---|---|---|---|---|---|---|---|---|---|
| 0.37.03 | 17.05 | 13.406 | 27.62 | 20.1 | 0.05 | 41.48 | 38.37 | 1026.60 | 67.39 |

**Table 8: Mountain Downhill (B1)**

| Trip Duration h.mm.ss | Distance (mi) | V*Apos‡ | Average Speed (mi/h) | Standstill % | Constant % | Acceleration % | Deceleration % | Cumulative pos. altitude (m) | Average temperature (F) |
|---|---|---|---|---|---|---|---|---|---|
| 0.33.20 | 17.99 | 14.703 | 32.39 | 10.3 | 0.15 | 48.40 | 41.15 | 80.70 | 66.52 |

**Table 9: Long Beach to CARB (A0)**

| Trip Duration h.mm.ss | Distance (mi) | V*Apos‡ | Average Speed (mi/h) | Standstill % | Constant % | Acceleration % | Deceleration % | Cumulative pos. altitude (m) | Average temperature (F) |
|---|---|---|---|---|---|---|---|---|---|
| 0.31.22 | 24.00 | 11.608 | 45.91 | 9.67 | 0.31 | 47.34 | 42.67 | 226.44 | 69.08 |

**Table 10: LA City**

| Trip Duration h.mm.ss | Distance (mi) | V*Apos‡ | Average Speed (mi/h) | Standstill % | Constant % | Acceleration % | Deceleration % | Cumulative pos. altitude (m) | Average temperature (F) |
|---|---|---|---|---|---|---|---|---|---|
| 0.56.56 | 15.86 | 12.097 | 16.71 | 29.04 | 0.06 | 36.34 | 34.57 | 254.31 | 72.35 |

‡V*Apos results are the 95$^{th}$ percentile values displayed in $m^2/s^3$

## 5. Routes

The routes for on-road emissions testing are approved by CARB and intended to include various road and traffic conditions. These routes include mountain driving at high elevation, urban driving, and highway driving. These routes are separated into six test sections with no key-off cycles between A0 and B2.

**Table 11: Description of Test Routes and Calculated Trip Statistics**

| Route | Distance (mi) | Segment Duration | Max – Min Elevation (m) | Average Speed (mph) | Fraction Hwy | Fraction Urban/Rural |
|---|---|---|---|---|---|---|
| A0 | 24 | 31 min | 125 | 46 | 82 | 18 |
| A1 | 28 | 41 min | 283 | 41 | 79 | 21 |
| A2 | 17 | 37 min | 976 | 28 | 0 | 100 |
| B1 | 18 | 33 min | 988 | 32 | 7 | 93 |
| B2 | 28 | 33 min | 290 | 51 | 79 | 21 |
| LA City | 16 | 57 min | 76 | 17 | 3 | 97 |

### 5.1 Highway Sections (A1 & B2)

These routes are representative of highway driving in California. Each route segment is approximately 28 miles and is composed of 95% highway and 5% surface roads. These segments travel between Vineyard Ave, Ontario CA and California Air Resource Board office at 9528 Telstar Ave, El Monte CA via Hwy 10. The average speed is 50mph and the net elevation change is approximately 938ft (286m).

## A1 – Highway East

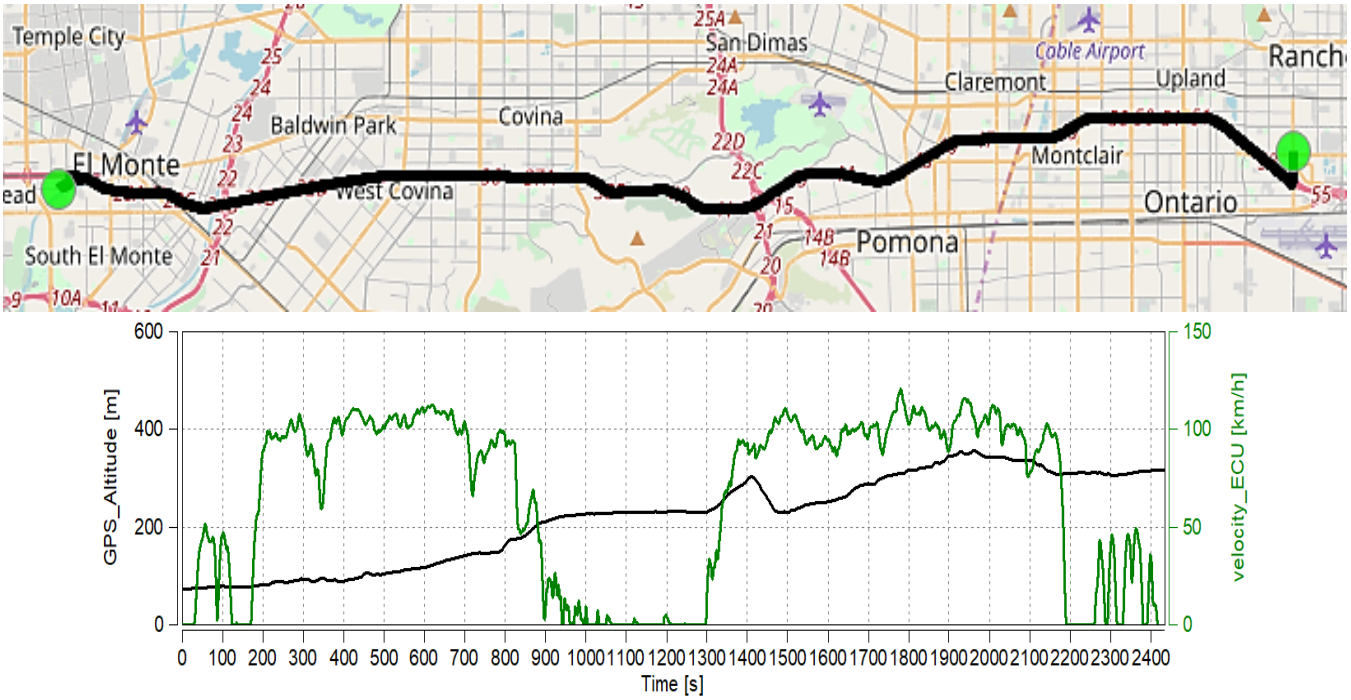



Figure 1. Map of Route A1 – Highway East. Including speed and elevation

## B2 – Highway West

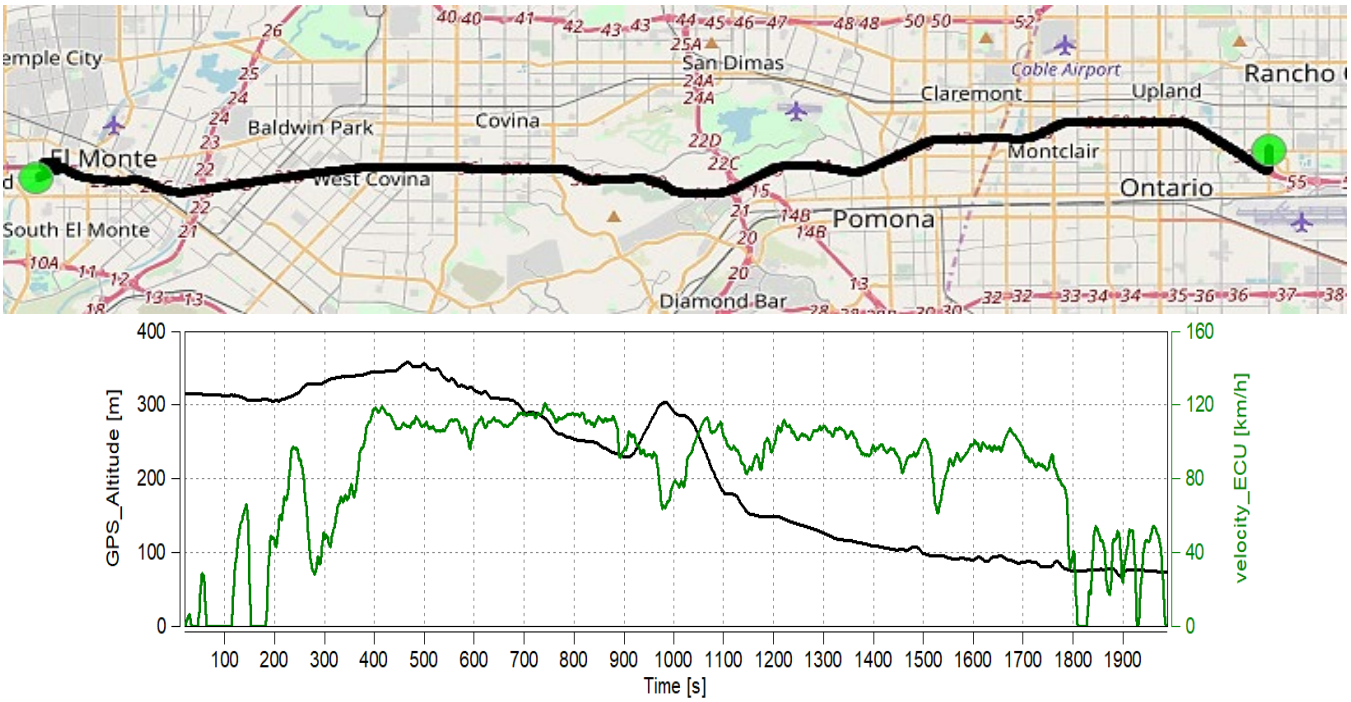



Figure 2. Map of Route B2 – Highway West. Including speed and elevation

### 5.2 Mountain Sections (A2 & B1)

This route is representative of rural uphill and downhill driving. Each route segment is approximately 17.5 miles and is composed of 90% surface roads and 10% highway, starting from Vineyard Ave in Ontario and traveling to Mt. Baldy, then returning to Vineyard Ave. The average speed is 30mph. The net elevation change is 3242ft (988m).

**A2 – Mountain Uphill**

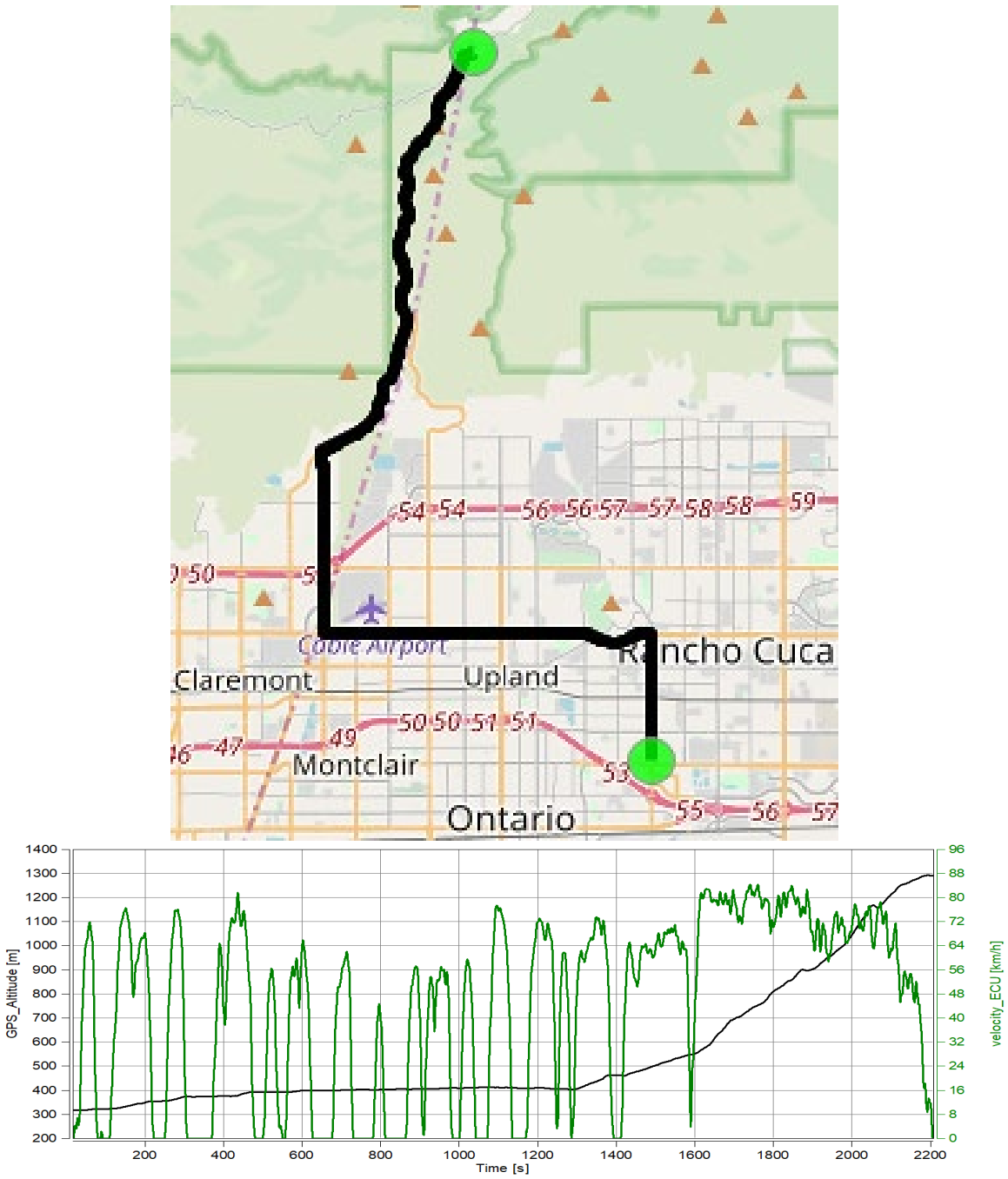



Figure 3. Map of Route A2 – Mountain Uphill. Including speed and elevation

**B1 – Mountain Downhill.**

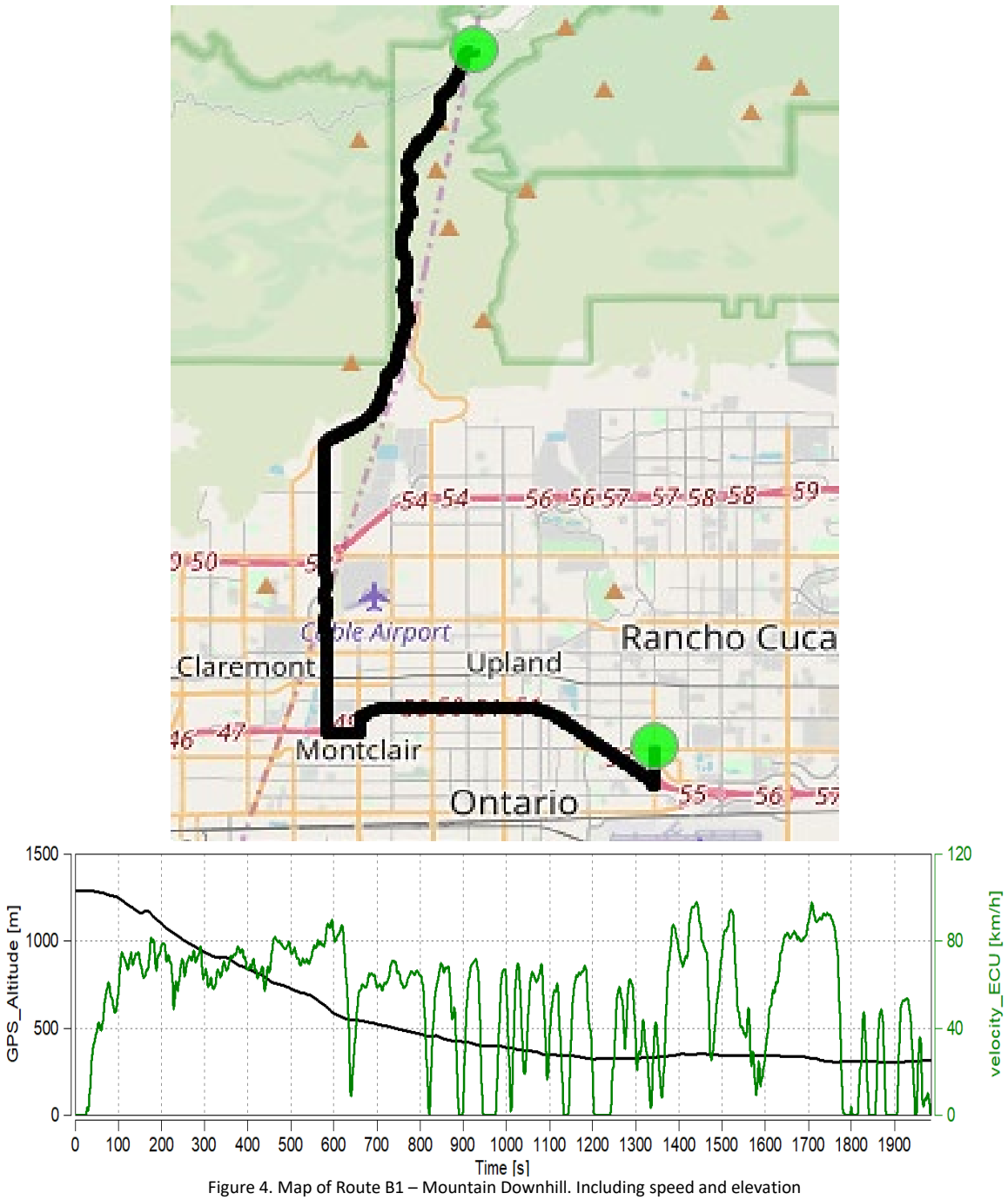



Figure 4. Map of Route B1 – Mountain Downhill. Including speed and elevation

### 5.3 Long Beach to CARB Section (A0)

This route travels between 4035 Via Oro Ave, Long Beach CA and 9528 Telstar Ave, El Monte CA. This route contains a cold start event with the test vehicle normalized to ambient conditions, beginning from Long Beach.

**A0 – Long Beach to CARB**

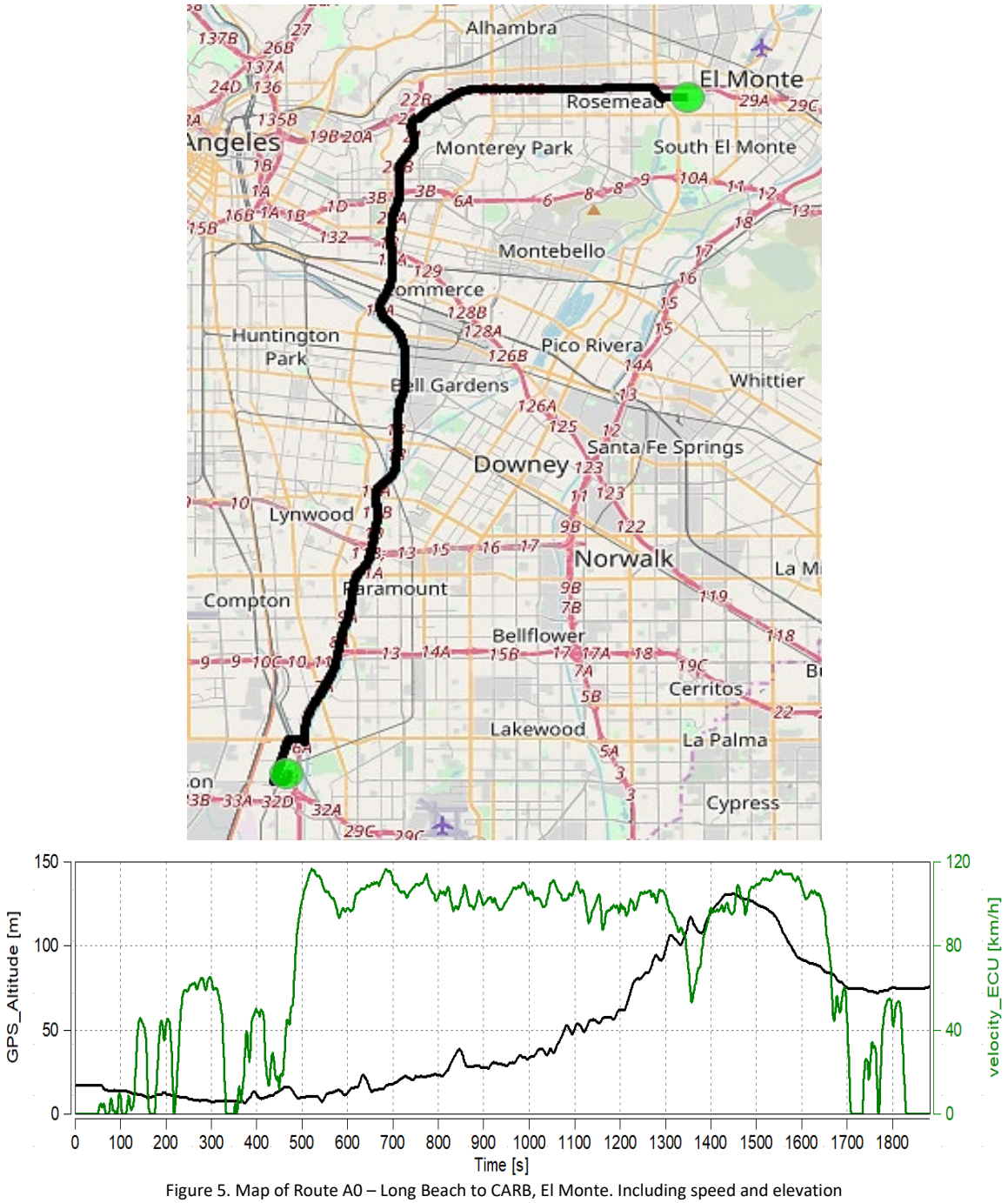



Figure 5. Map of Route A0 – Long Beach to CARB, El Monte. Including speed and elevation

### 5.4 LA City Driving Section

This route is intended to represent city driving and is a modernized reflection of the LA4. There are minor modifications to account for traffic patterns and roads which have changed since 1972 but this route represents a similar pattern to the original route. The route is approximately 16 miles and is 20% highway, 80% surface road with an average speed of 16mph.

**LA City Route**

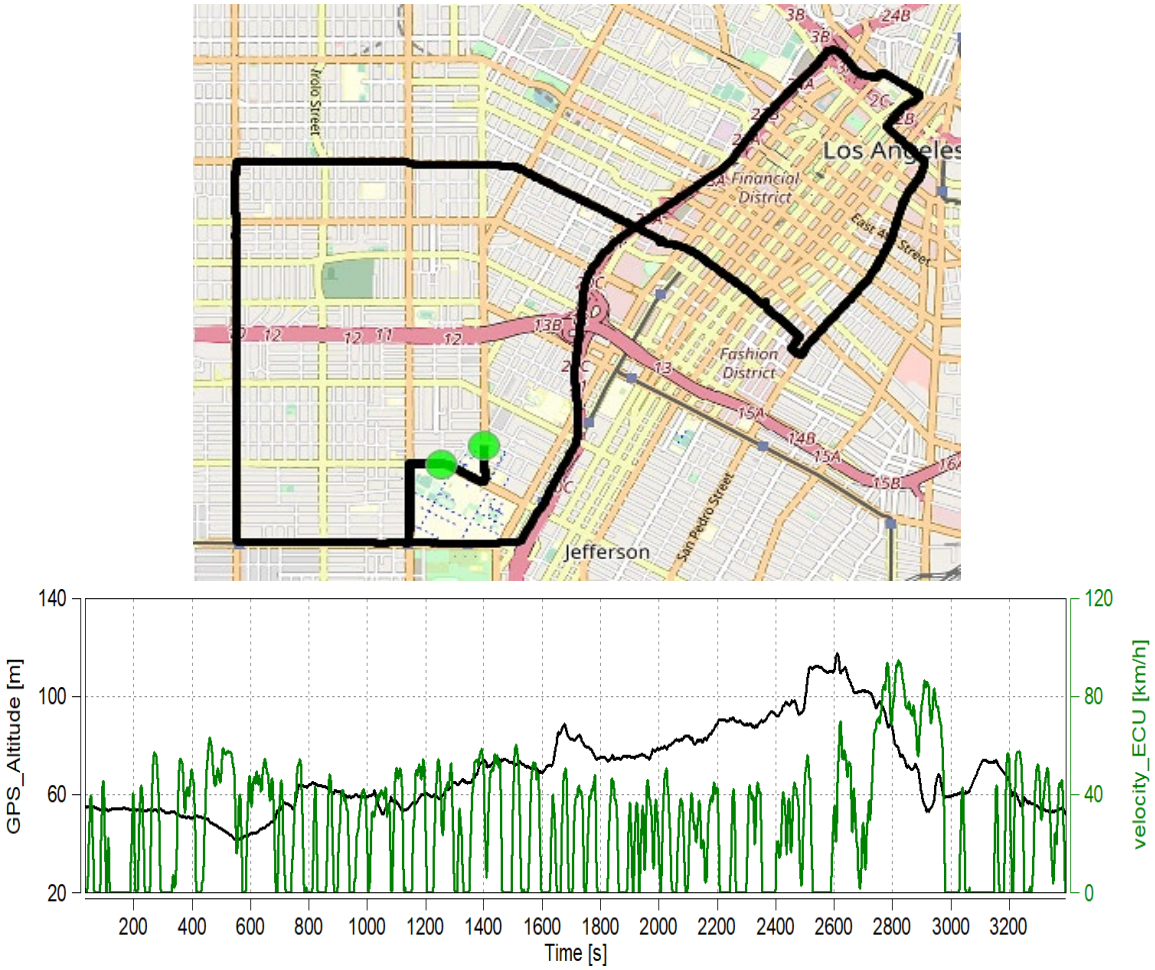



Figure 6. Map of LA City Route. Including speed and elevation

## 6. Log Sheets

A comprehensive list with information regarding each PEMS test conducted is provided separately as an addendum to this report. In addition to the information concerning PEMS test results, all test records will also be provided in the same file.

The information is provided in the file: Flat_File_Log_Sheet_A220 1-March-2021.pdf

This file contains log sheet information on PEMS testing conducted with the MY2022 Mercedes-Benz A220 test vehicle W177-4577. The table also includes information and explanations on valid, aborted, and invalid tests.

## 7. Appendix

The following pages include emission report summaries for each valid test performed using the PEMS system and AVL post processing.

# Case: W177-4577
# Page: Trip Summary

'A1 HWY EAST'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019

| | | |
|---|---|---|
| Trip Duration | 2434.00 | s |
| Trip Duration (a) | 2434.00 | s |
| Trip Distance | 27.62 | mi |
| Trip Distance (a) | 27.62 | mi |
| | | |
| Trip Fuel Cons. (b) | 2.23 | kg |
| Trip Fuel Cons. (ab) | 2.23 | kg |
| Trip Fuel Cons. EU (ac) | 2.33 | kg |
| Trip Fuel Cons. US (ac) | 2.34 | kg |
| | | |
| Trip Fuel Economy (b) | 35.12 | mpg_US |
| Trip Fuel Economy (ab) | 35.12 | mpg_US |
| Trip Fuel Economy EU (ac) | 33.50 | mpg_US |
| Trip Fuel Economy US (ac) | 33.42 | mpg_US |
| Trip Fuel Economy GGE (b) | 35.12 | mpg_US |
| Trip Fuel Economy GGE (ab) | 35.12 | mpg_US |
| Trip Fuel Economy EU GGE (ac) | 33.50 | mpg_US |
| Trip Fuel Economy US GGE (ac) | 33.42 | mpg_US |
| | | |
| Trip Av. Eng. Speed | 1396.31 | rpm |
| Trip Av. Torque | 54.79 | lbft |
| Trip Av. Power | 17.82 | hp |
| Trip Work | | |
| Trip Work (a) | 12.05 | hphr |
| | | |
| Trip Exhaust Mass | 38.12 | kg |
| Trip Exhaust Mass EU (ac) | 35.54 | kg |
| Trip Exhaust Mass US (ac) | 35.49 | kg |
| | | |
| Trip Av. Amb. Temperature | 71.40 | deg_F |
| Trip Av. Humidity | 12.98 | % |
| Trip Av. GPS Altitude | 219.80 | m |
| | | |
| Fuel Type | Petrol (E10) | |

| | | |
|---|---|---|
| ave THC | 6.87200 | ppm |
| ave NMHC | 5.89897 | ppm |
| ave CH4 | 0.97303 | ppm |
| ave CO | 268.52485 | ppm |
| ave CO2 | 11.03779 | % |
| ave NOx | 9.12965 | ppm |
| ave PM | n/a | mg/m3 |
| ave Soot meas | n/a | mg/m3 |
| ave Soot | n/a | mg/m3 |
| ave PN | n/a | #/cm3 |
| | | |
| tot THC | 0.24267 | g |
| tot NMHC | 0.16645 | g |
| tot CH4 | 0.08278 | g |
| tot CO | 10.27339 | g |
| tot CO2 | 7085.90507 | g |
| tot NO (d) | 0.35198 | g |
| tot NO2 | 0.08480 | g |
| tot NOx | 0.43678 | g |
| tot Soot | n/a | g |
| tot Soot meas | n/a | g |
| tot PM | n/a | g |
| tot PN | n/a | # |
| | | |
| PM measurement type | 0.00000 | - |
| tot Soot on PM filter (estim.) | 0.00000 | mg |
| Soot --> PM simple scaling factor | 1.00000 | - |
| | | |
| Trip Av. Veh. Speed | 40.84580 | mi/hr |
| | | |
| Trip Distance Share Urban | 8.02183 | % distance |
| Trip Distance Share Rural | 12.60018 | % distance |
| Trip Distance Share Motorway | 79.37799 | % distance |

| | | |
|---|---|---|
| BS CO2 | 587.99547 | g/hphr |
| BS CO | 0.85250 | g/hphr |
| BS THC | 0.02014 | g/hphr |
| BS NMHC | 0.01381 | g/hphr |
| BS CH4 | 0.00687 | g/hphr |
| BS NO (d) | 0.02921 | g/hphr |
| BS NO2 | 0.00704 | g/hphr |
| BS NOx | 0.03624 | g/hphr |
| BS Soot | n/a | g/hphr |
| BS Soot meas | n/a | g/hphr |
| BS PM | n/a | g/hphr |
| BS PN | n/a | #/hpr |
| | | |
| DS CO2 | 256.58414 | g/mi |
| DS CO | 0.37200 | g/mi |
| DS THC | 0.00879 | g/mi |
| DS NMHC | 0.00603 | g/mi |
| DS CH4 | 0.00300 | g/mi |
| DS NO (d) | 0.01275 | g/mi |
| DS NO2 | 0.00307 | g/mi |
| DS NOx | 0.01582 | g/mi |
| DS Soot | n/a | g/mi |
| DS Soot meas | n/a | g/mi |
| DS PM | n/a | g/mi |
| DS PN | n/a | #/mi |
| | | |
| FS CO2 | 3184.34936 | g/kg |
| FS CO | 4.61678 | g/kg |
| FS THC | 0.10905 | g/kg |
| FS NMHC | 0.07480 | g/kg |
| FS CH4 | 0.03720 | g/kg |
| FS NO (d) | 0.15817 | g/kg |
| FS NO2 | 0.03811 | g/kg |
| FS NOx | 0.19628 | g/kg |
| FS Soot | n/a | g/kg |
| FS Soot meas | n/a | g/kg |
| FS PM | n/a | g/kg |
| FS PN | n/a | #/kg |

(a) GAS PEMS measurement state only, (b) based on fuel rate input (ECU, Fuel Meter), (c) Based on A/F ratio (eq 28-32 - R49)
(d) NO calculated using molecular weight of NO2, GGE=Gasoline Gallon Equivalents

| | | |
|---|---|---|
| Trip Duration | 2434.00 | s |
| Trip Duration (a) | 2434.00 | s |
| Trip Distance | 27.62 | mi |
| Trip Distance (a) | 27.62 | mi |
| | | |
| Trip Fuel Cons. (b) | 2.23 | kg |
| Trip Fuel Cons. (ab) | 2.23 | kg |
| Trip Fuel Cons. EU (ac) | 2.33 | kg |
| Trip Fuel Cons. US (ac) | 2.34 | kg |
| | | |
| Trip Fuel Economy (b) | 35.12 | mpg_US |
| Trip Fuel Economy (ab) | 35.12 | mpg_US |
| Trip Fuel Economy EU (ac) | 33.50 | mpg_US |
| Trip Fuel Economy US (ac) | 33.42 | mpg_US |
| Trip Fuel Economy GGE (b) | 35.12 | mpg_US |
| Trip Fuel Economy GGE (ab) | 35.12 | mpg_US |
| Trip Fuel Economy EU GGE (ac) | 33.50 | mpg_US |
| Trip Fuel Economy US GGE (ac) | 33.42 | mpg_US |
| | | |
| Trip Av. Eng. Speed | 1396.31 | rpm |
| Trip Av. Torque | 54.79 | lbft |
| Trip Av. Power | 17.82 | hp |
| Trip Work | | |
| Trip Work (a) | 12.05 | hphr |
| | | |
| Trip Exhaust Mass | 38.12 | kg |
| Trip Exhaust Mass EU (ac) | 35.54 | kg |
| Trip Exhaust Mass US (ac) | 35.49 | kg |
| | | |
| Trip Av. Amb. Temperature | 71.40 | deg_F |
| Trip Av. Humidity | 12.98 | % |
| Trip Av. GPS Altitude | 219.80 | m |
| | | |
| Fuel Type | Petrol (E10) | |

| | | |
|---|---|---|
| ave THC DC | 6.90453 | ppm |
| ave NMHC DC | 5.87201 | ppm |
| ave CH4 DC | 1.03253 | ppm |
| ave CO DC | 265.52214 | ppm |
| ave CO2 DC | 11.06334 | % |
| ave NOx DC | 9.13237 | ppm |
| ave PM | n/a | mg/m3 |
| ave Soot meas | n/a | mg/m3 |
| ave Soot | n/a | mg/m3 |
| ave PN DC | | |
| | | |
| tot THC DC | 0.24298 | g |
| tot NMHC DC | 0.16586 | g |
| tot CH4 DC | 0.08356 | g |
| tot CO DC | 10.15851 | g |
| tot CO2 DC | 7102.30763 | g |
| tot NO DC (d) | 0.35204 | g |
| tot NO2 DC | 0.08489 | g |
| tot NOx DC | 0.43692 | g |
| tot Soot | n/a | g |
| tot Soot meas | n/a | g |
| tot PM | n/a | g |
| tot PN DC | | |
| | | |
| PM measurement type | 0.00000 | - |
| tot Soot on PM filter (estim.) | 0.00000 | mg |
| Soot --> PM simple scaling factor | 1.00000 | - |
| | | |
| Trip Av. Veh. Speed | 40.84580 | mi/hr |
| | | |
| Trip Distance Share Urban | 8.02183 | % distance |
| Trip Distance Share Rural | 12.60018 | % distance |
| Trip Distance Share Motorway | 79.37799 | % distance |

| | | |
|---|---|---|
| BS CO2 DC | 589.35657 | g/hphr |
| BS CO DC | 0.84296 | g/hphr |
| BS THC DC | 0.02016 | g/hphr |
| BS NMHC DC | 0.01376 | g/hphr |
| BS CH4 DC | 0.00693 | g/hphr |
| BS NO DC (d) | 0.02921 | g/hphr |
| BS NO2 DC | 0.00704 | g/hphr |
| BS NOx DC | 0.03626 | g/hphr |
| BS Soot | n/a | g/hphr |
| BS Soot meas | n/a | g/hphr |
| BS PM | n/a | g/hphr |
| BS PN DC | | |
| | | |
| DS CO2 DC | 257.17809 | g/mi |
| DS CO DC | 0.36784 | g/mi |
| DS THC DC | 0.00880 | g/mi |
| DS NMHC DC | 0.00601 | g/mi |
| DS CH4 DC | 0.00303 | g/mi |
| DS NO DC (d) | 0.01275 | g/mi |
| DS NO2 DC | 0.00307 | g/mi |
| DS NOx DC | 0.01582 | g/mi |
| DS Soot | n/a | g/mi |
| DS Soot meas | n/a | g/mi |
| DS PM | n/a | g/mi |
| DS PN DC | | |
| | | |
| FS CO2 DC | 3191.72054 | g/kg |
| FS CO DC | 4.56515 | g/kg |
| FS THC DC | 0.10919 | g/kg |
| FS NMHC DC | 0.07453 | g/kg |
| FS CH4 DC | 0.03755 | g/kg |
| FS NO DC (d) | 0.15820 | g/kg |
| FS NO2 DC | 0.03815 | g/kg |
| FS NOx DC | 0.19635 | g/kg |
| FS Soot | n/a | g/kg |
| FS Soot meas | n/a | g/kg |
| FS PM | n/a | g/kg |
| FS PN DC | | |

(a) GAS PEMS measurement state only, (b) based on fuel rate input (ECU, Fuel Meter), (c) Based on A/F ratio (eq 28-32 - R49)
(d) NO calculated using molecular weight of NO2, GGE=Gasoline Gallon Equivalents

Case: W177-4577
Page: Time Alignment Check

'A1 HWY EAST'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto

Absolute Time

y_THC
y_NO
y_CO2
y_O2
c_Soot
Fuel Rate
Exhaust Mass
Torque
Velocity ECU

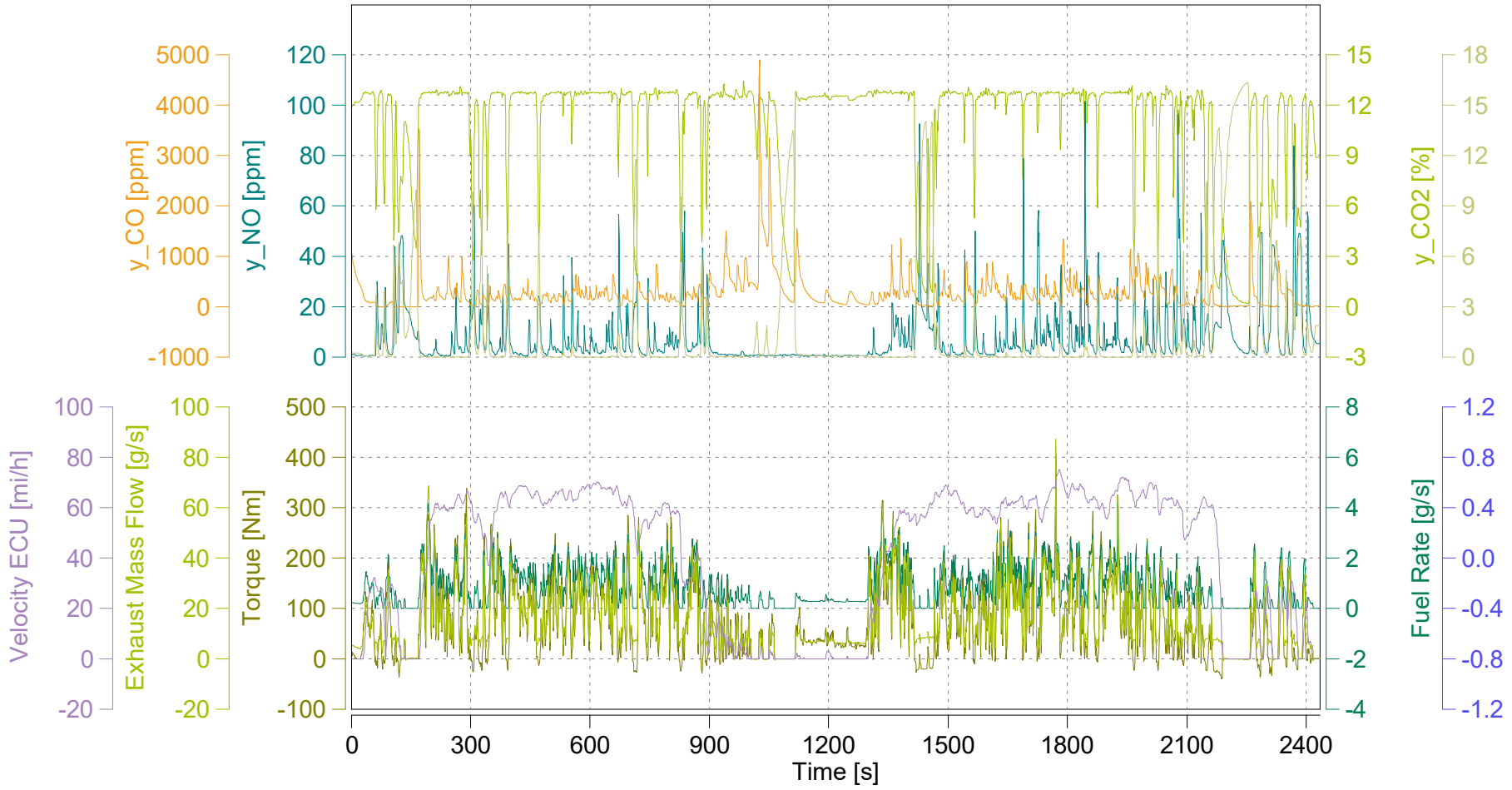
AVL 492 Defa

THC
NO/NO2
CO/CO2
O2

Apply Defa

Alignment Plo

Reset Time
Reset Al
Apply Curr



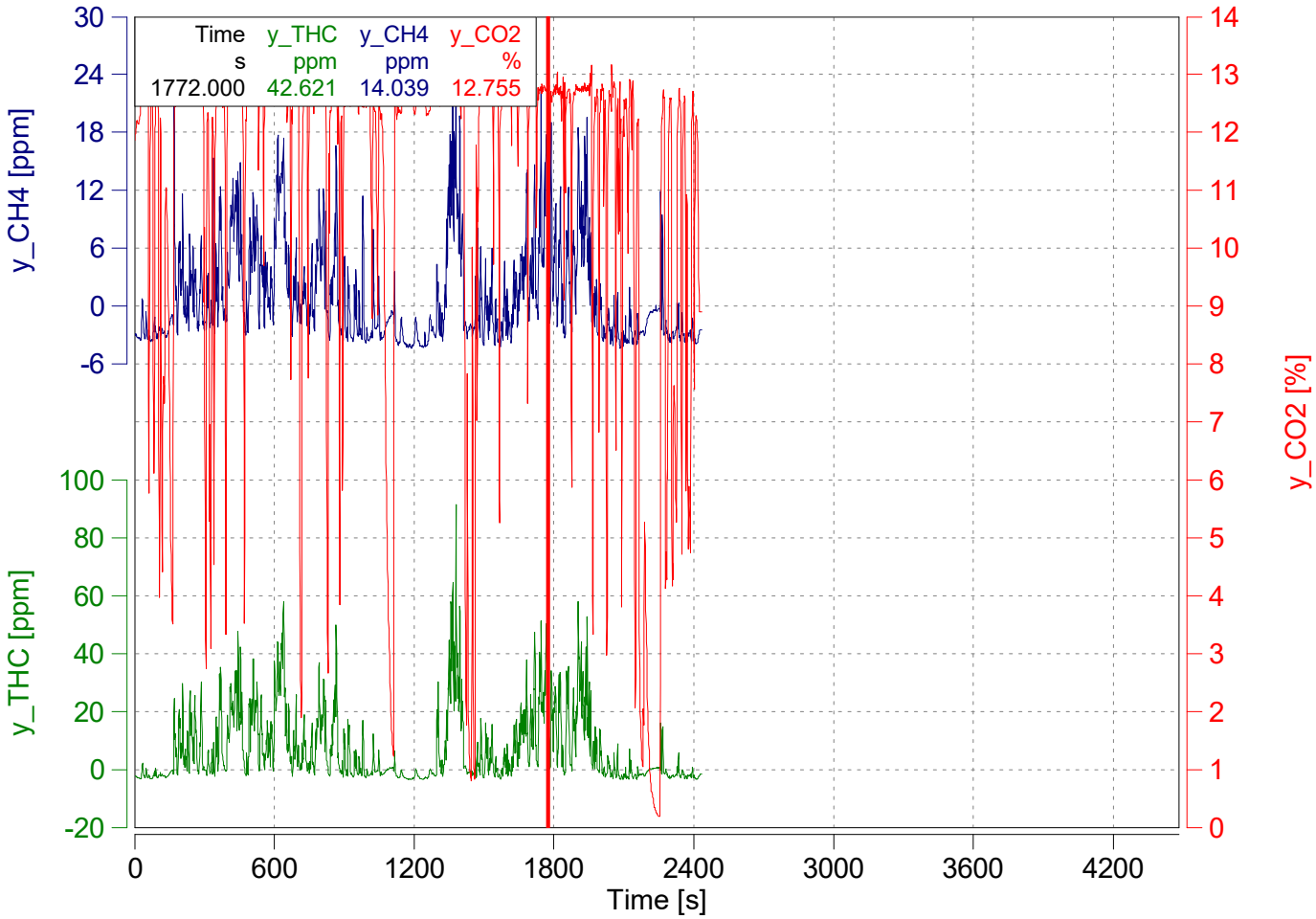

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: Time Alignment of Gas Concentrations

'A1 HWY EAST'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019




Absolute Time Shifts

| | | |
|---|---|---|
| y_THC | s | -5.2 |
| y_CH4 | s | -7.2 |

Reset Time Shifts in Plot

Apply Current Values

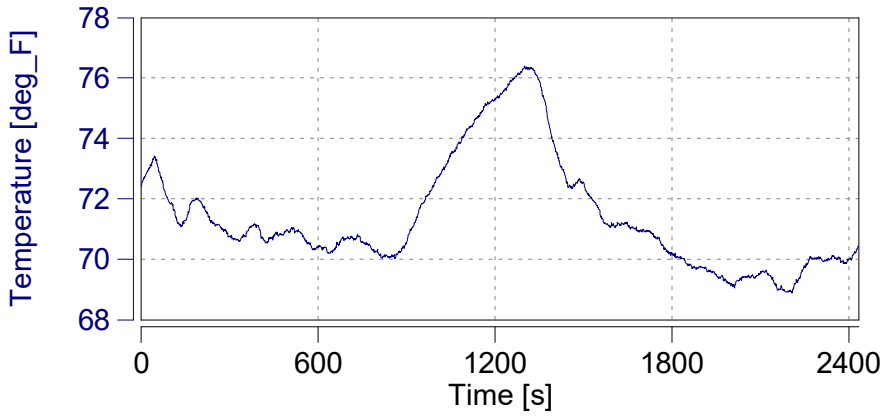
Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

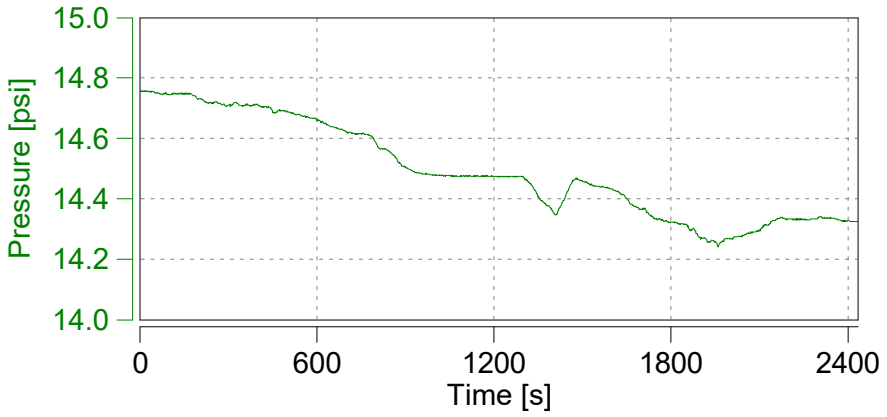
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

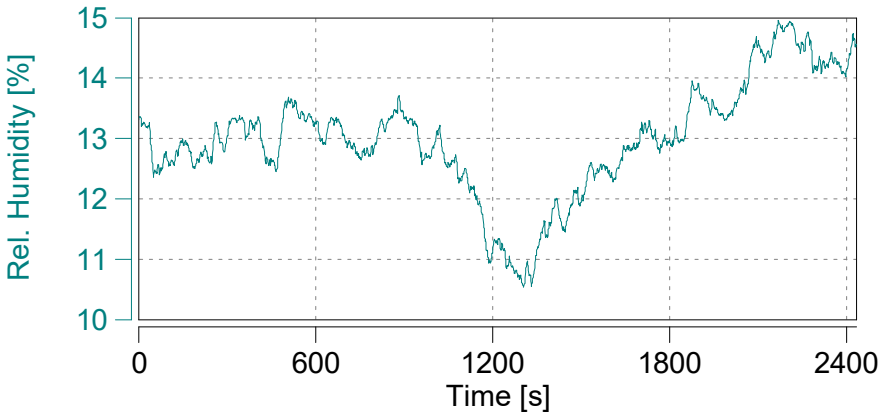
Case: W177-4577
Page: Ambient Conditions

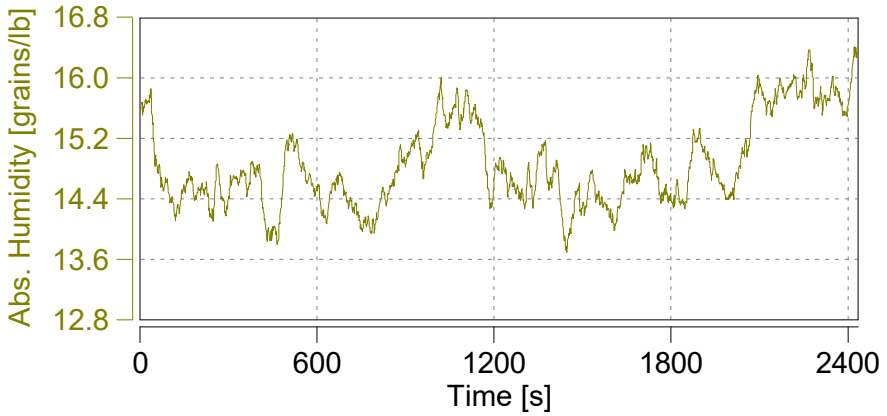
'A1 HWY EAST'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019



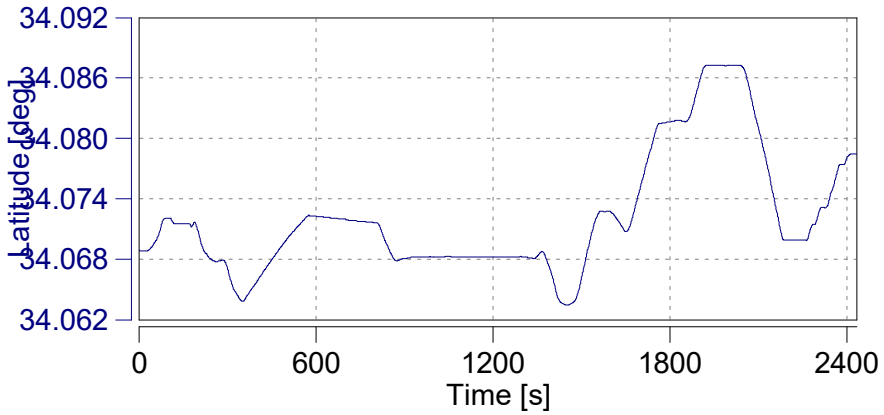

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

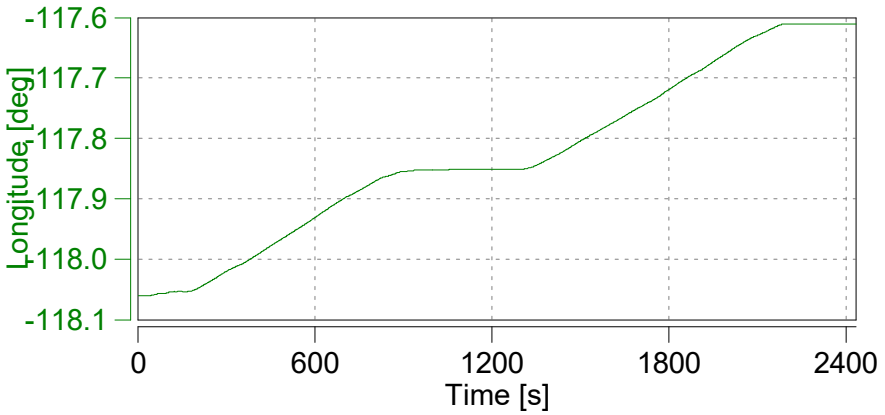
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

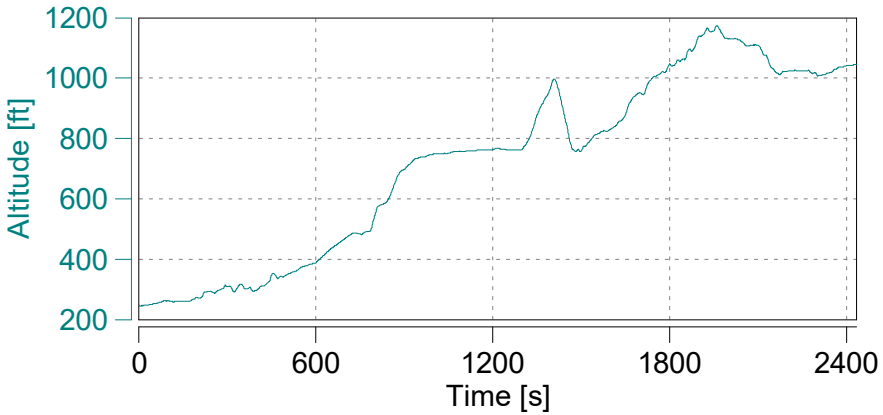
Case: W177-4577
Page: GPS

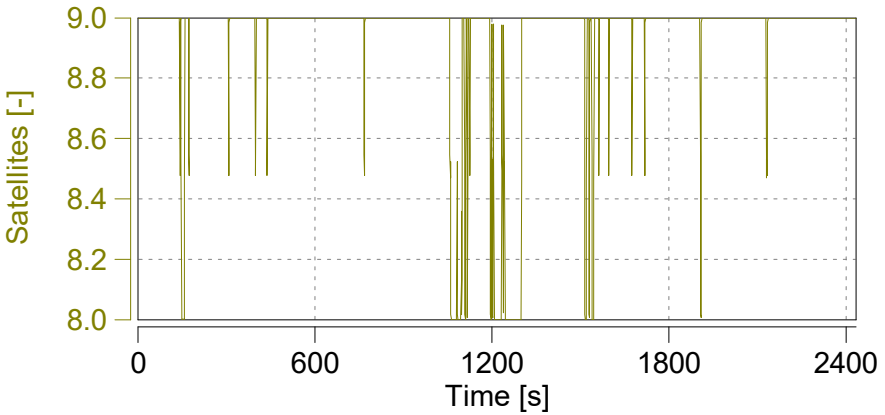
'A1 HWY EAST'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019



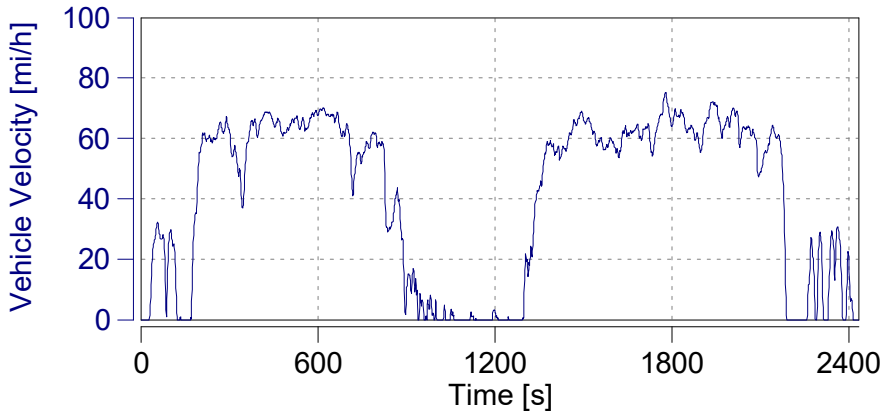

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

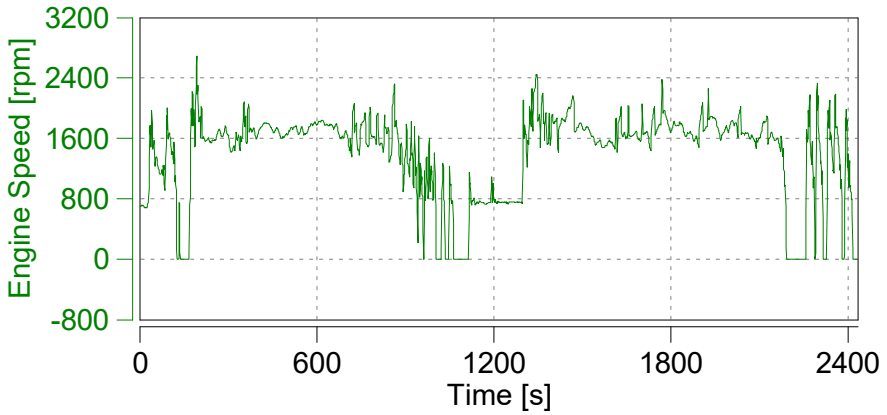
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

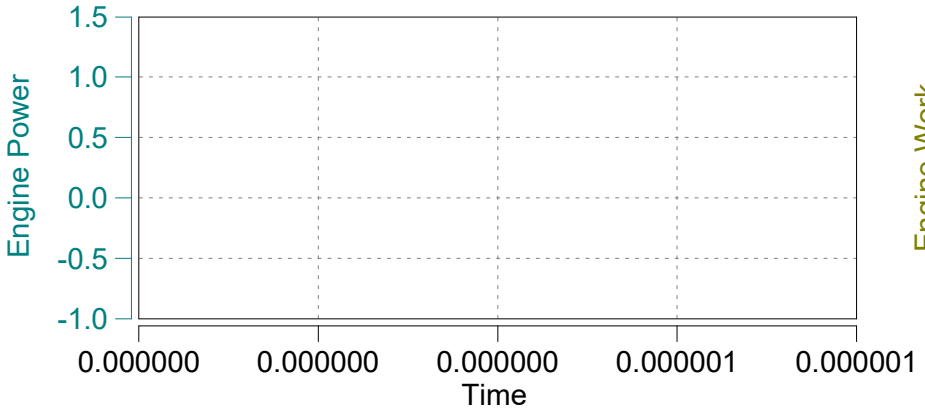
Case: W177-4577
Page: Engine (1)

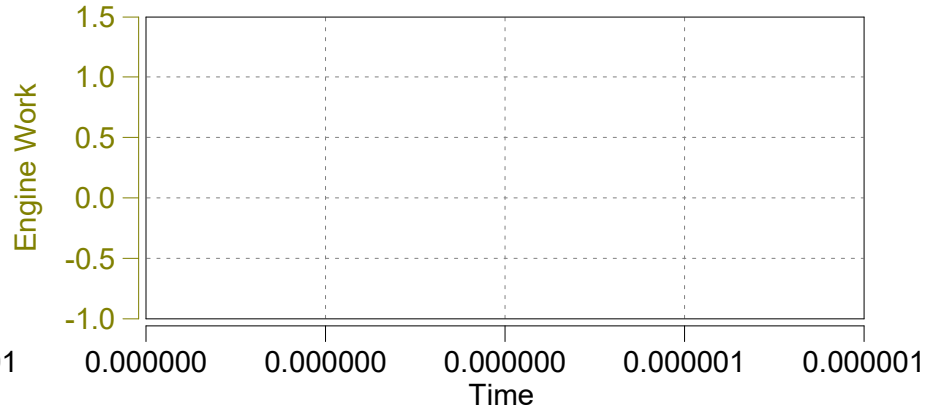
'A1 HWY EAST'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019



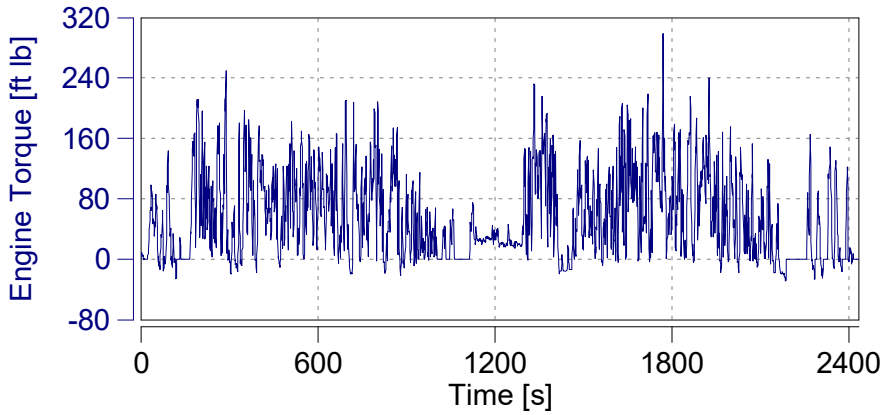

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

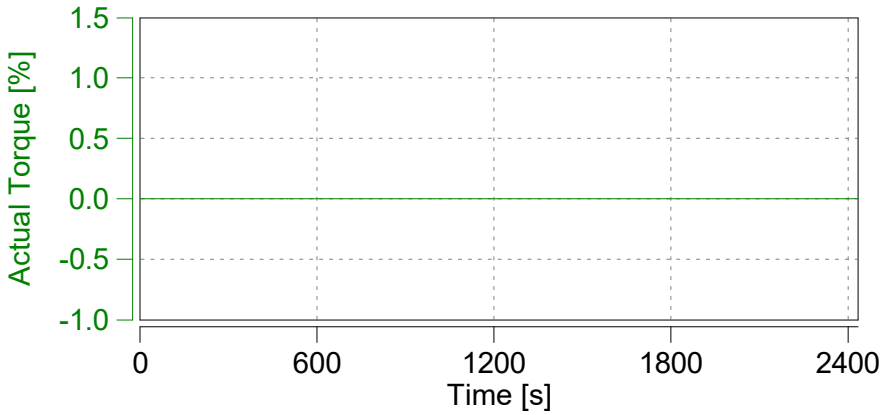
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

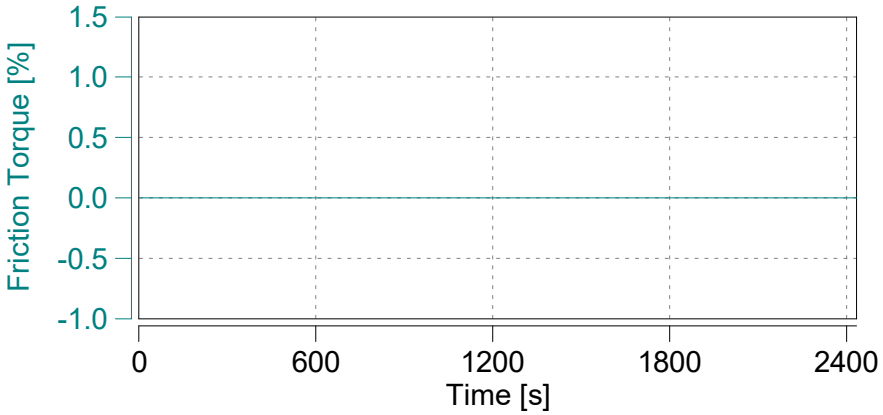
'A1 HWY EAST'
Start Date: 02/18/2021
Start Time: 10:14:32.0

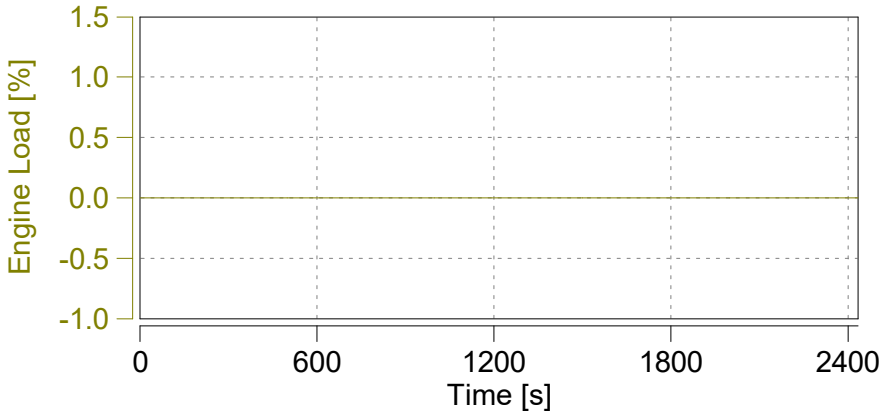
AVL

Concerto M.O.V.E, 2019



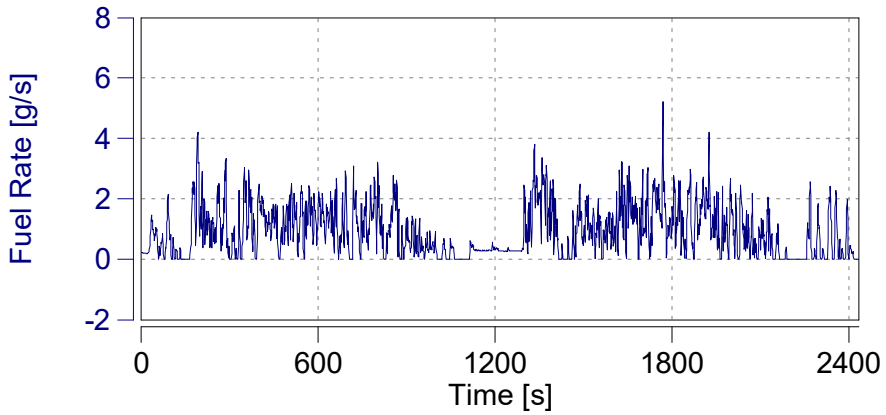



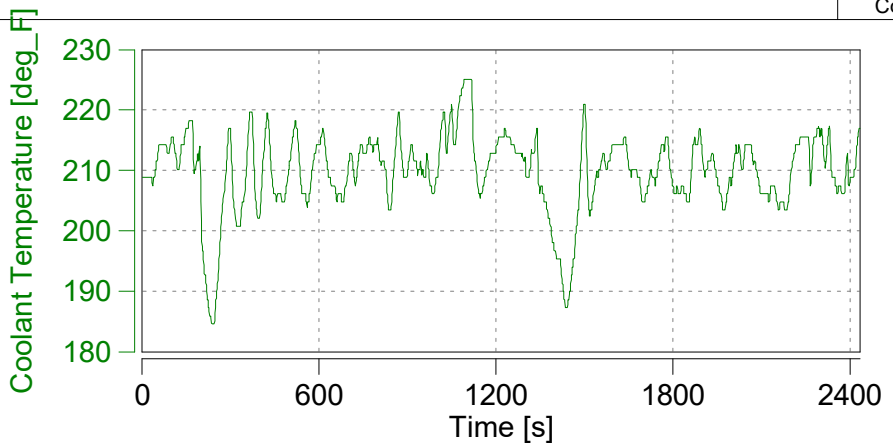



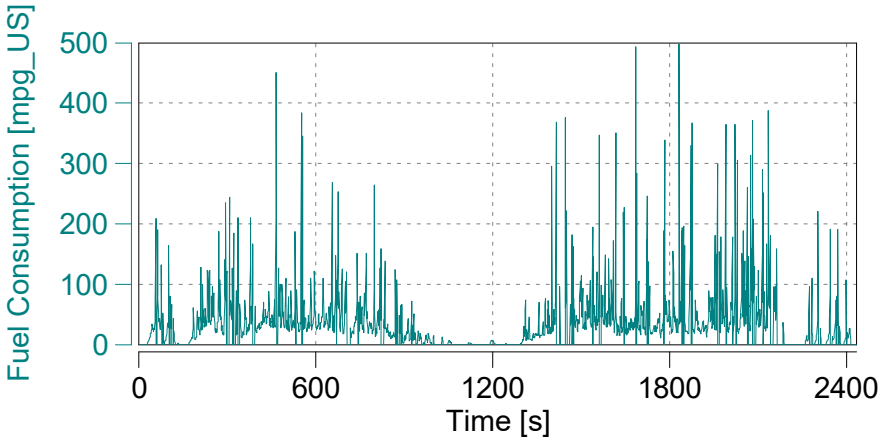
'A1 HWY EAST'
Start Date: 02/18/2021
Start Time: 10:14:32.0

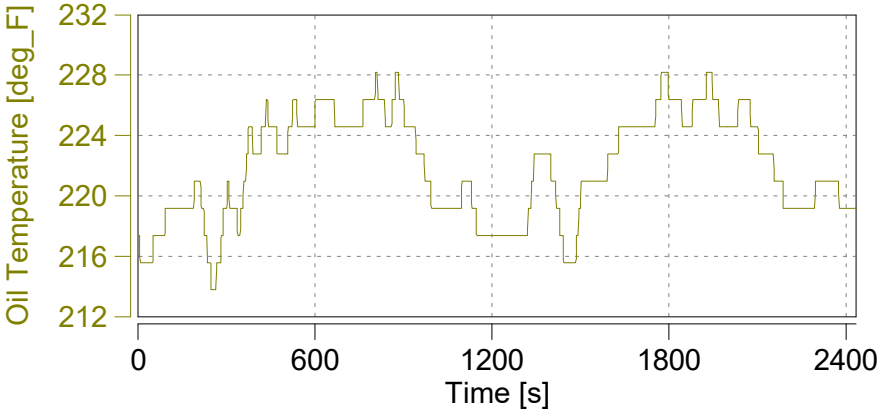
AVL

Concerto M.O.V.E, 2019



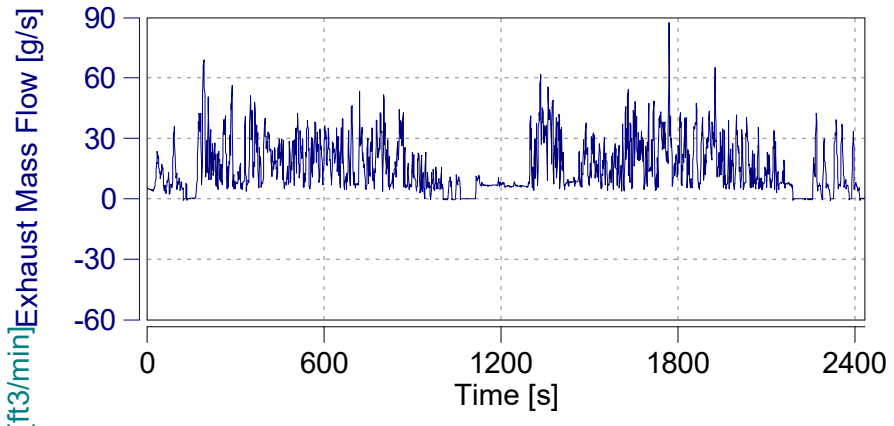

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

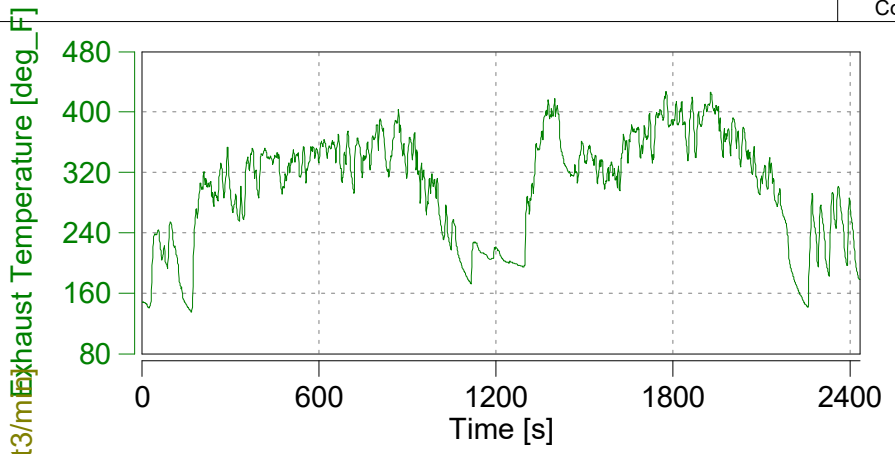
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

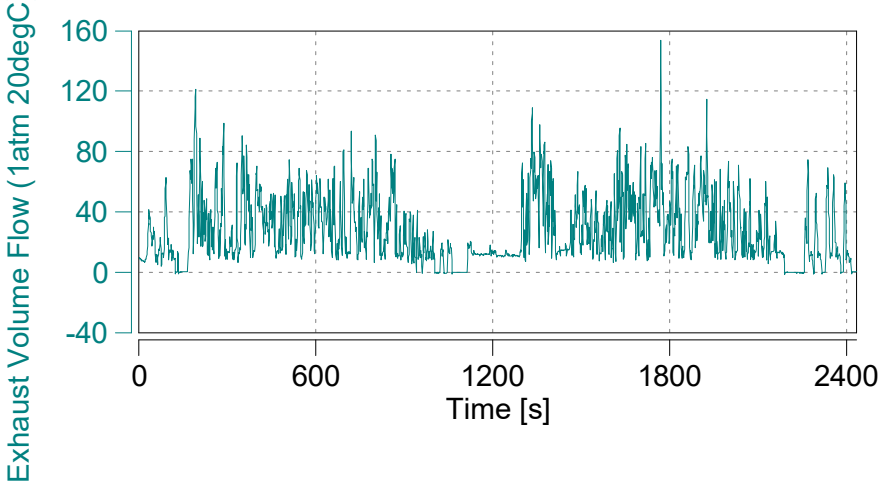
Case: W177-4577
Page: Exhaust Flow (1)

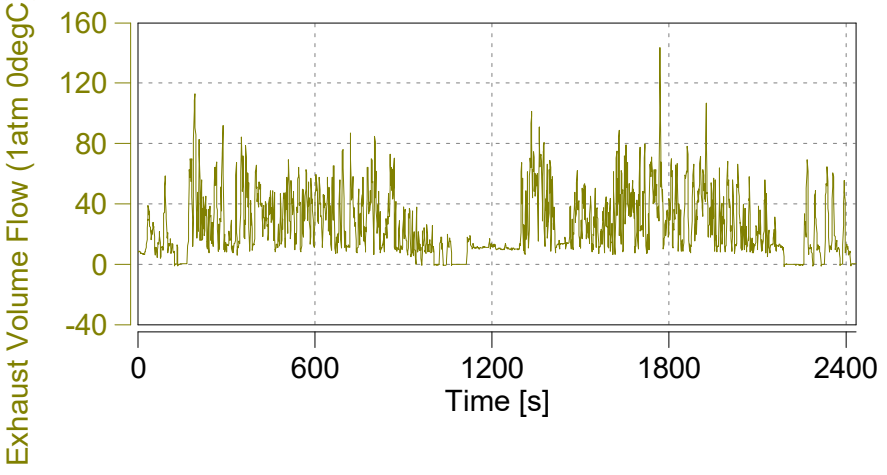
'A1 HWY EAST'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

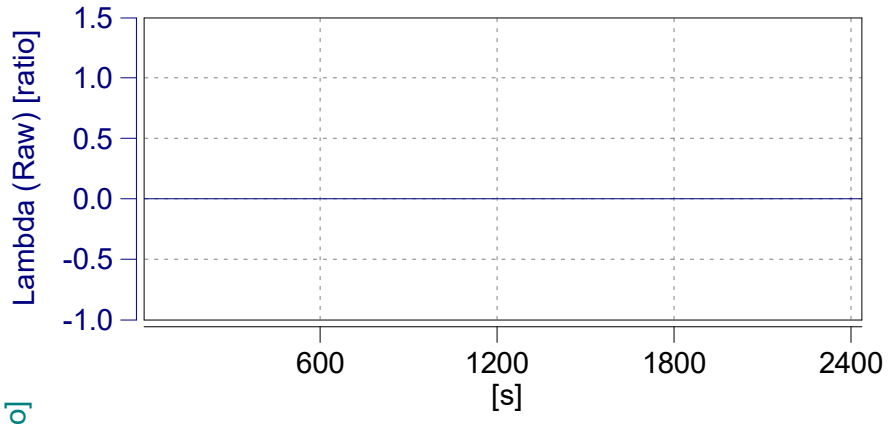
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

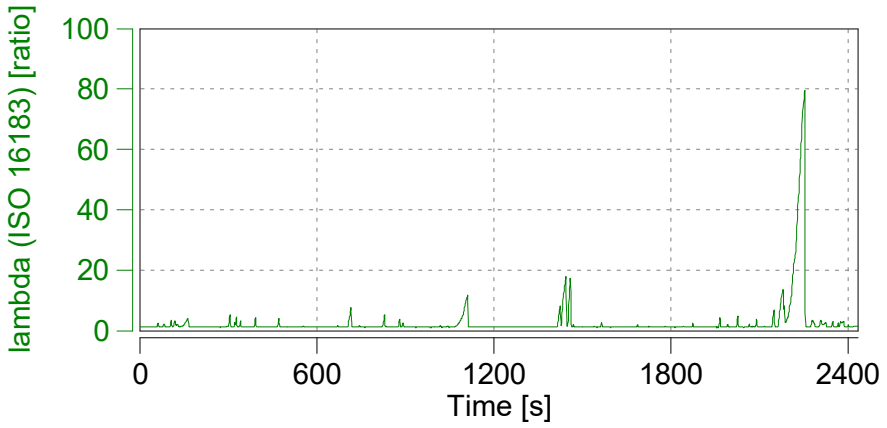
Case: W177-4577
Page: Exhaust Flow (2)

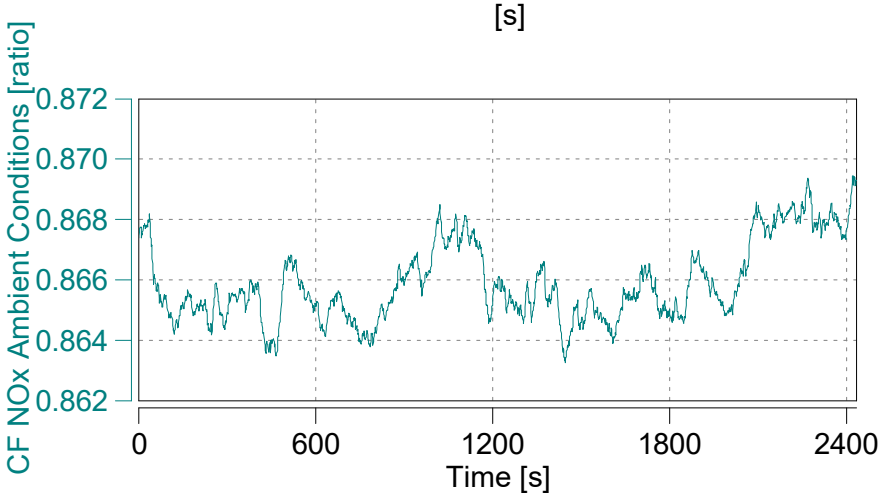
'A1 HWY EAST'
Start Date: 02/18/2021
Start Time: 10:14:32.0

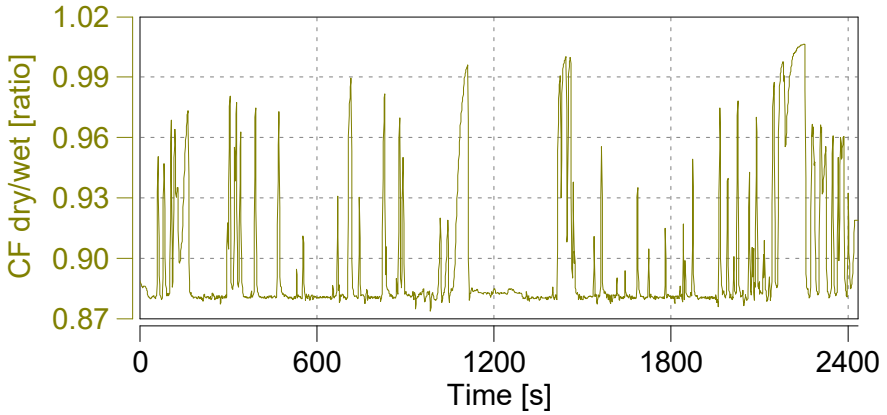
AVL

Concerto M.O.V.E, 2019



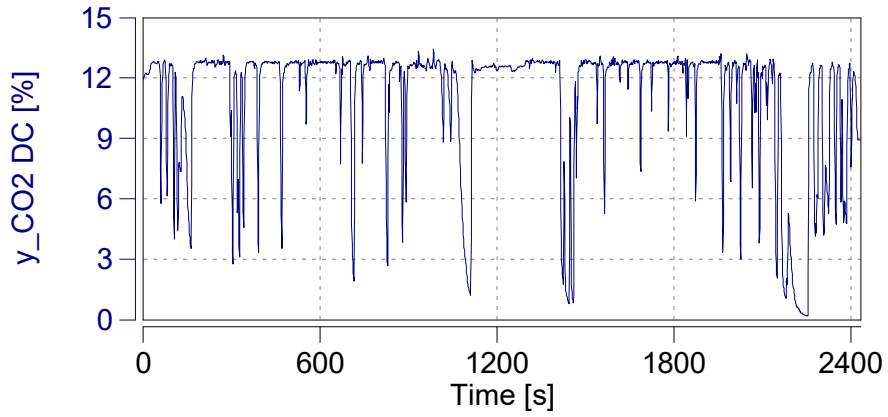

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

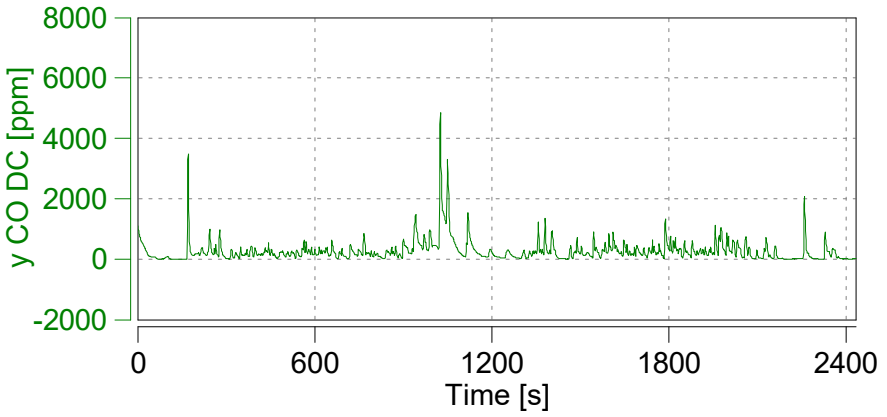
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

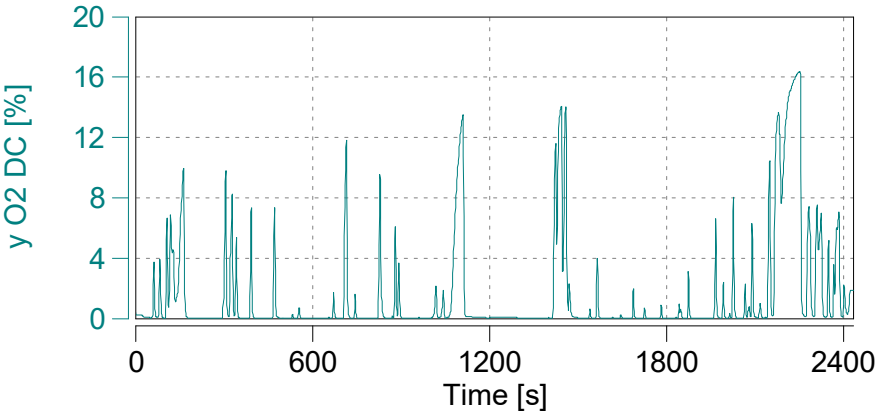
Case: W177-4577
Page: Corrected Emissions (1)

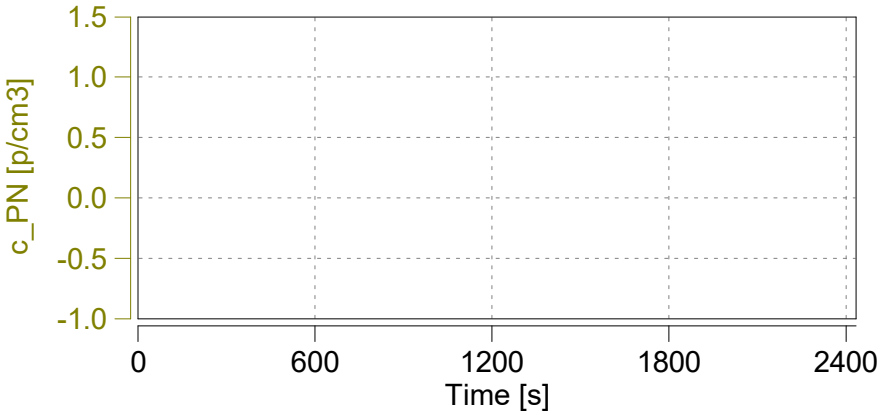
'A1 HWY EAST'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019



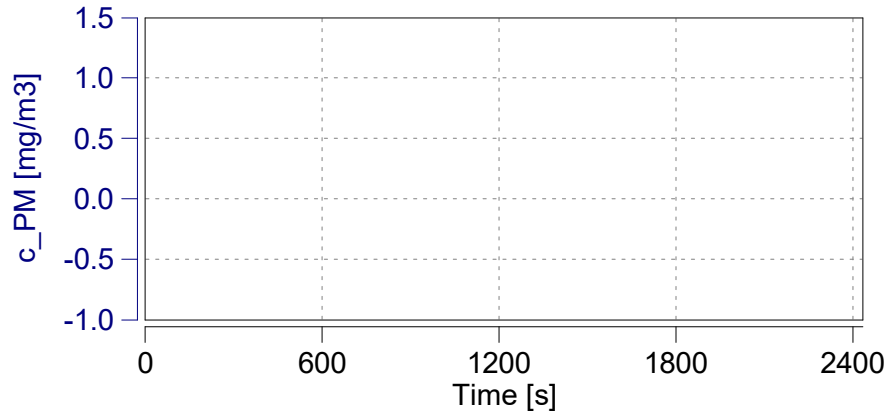

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

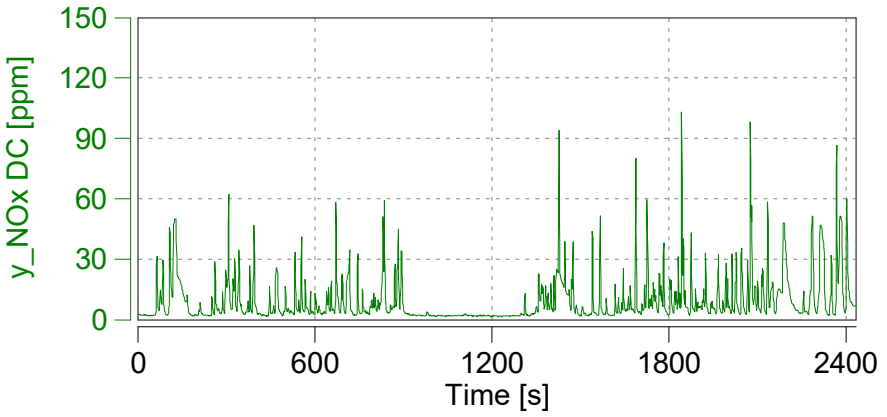
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

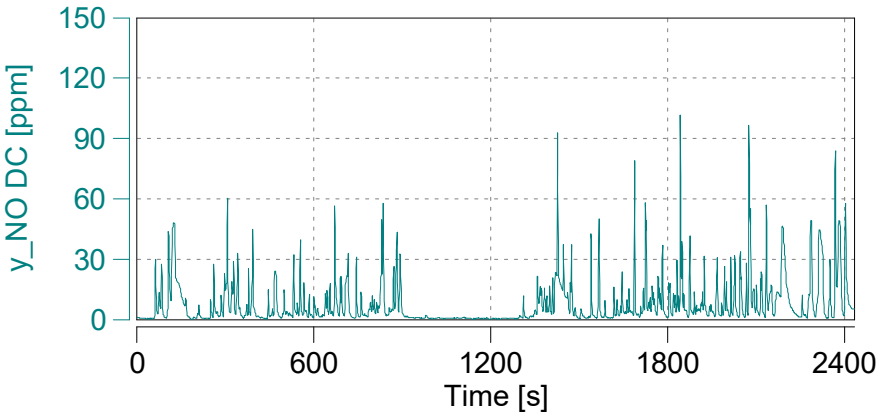
Case: W177-4577
Page: Corrected Emissions (2)

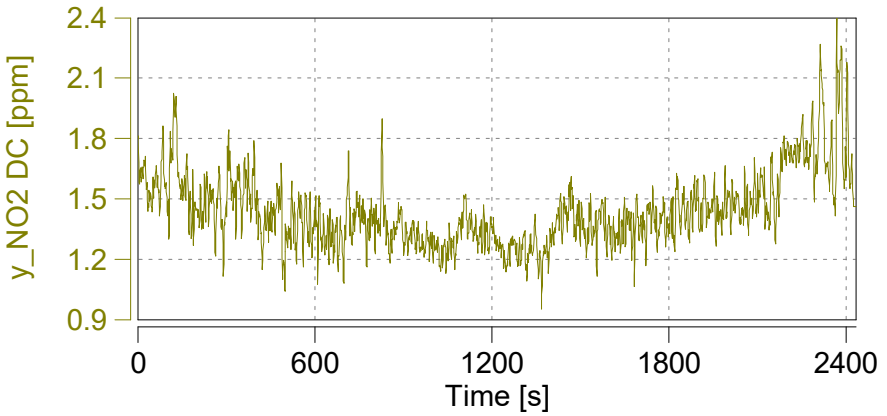
'A1 HWY EAST'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019



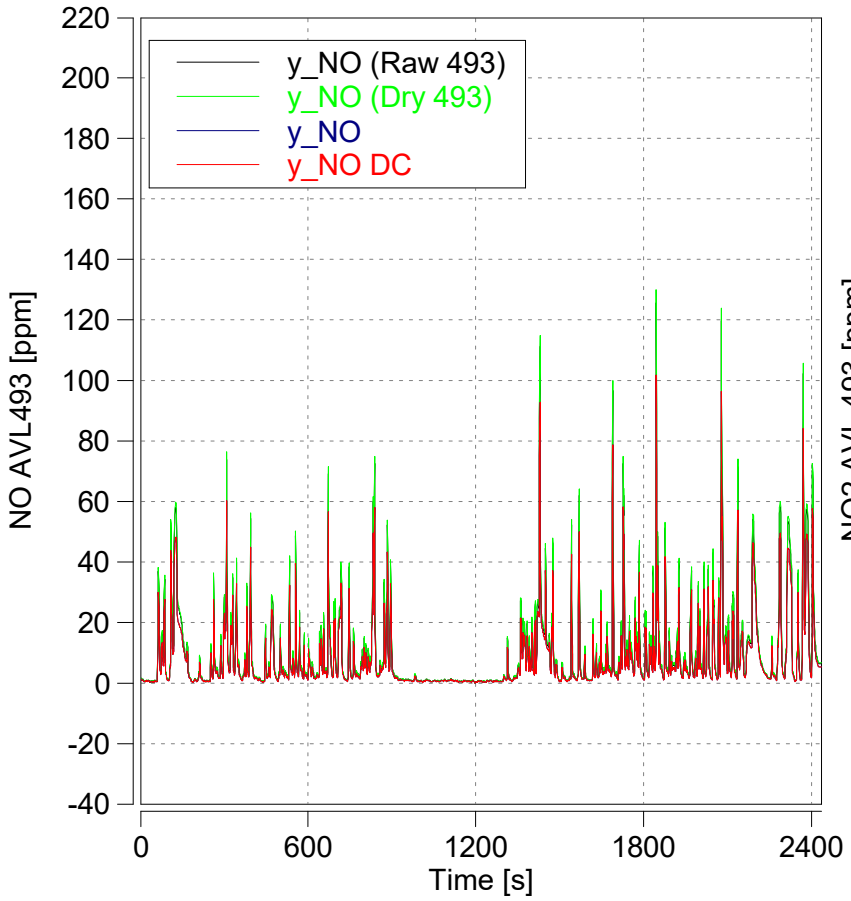

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

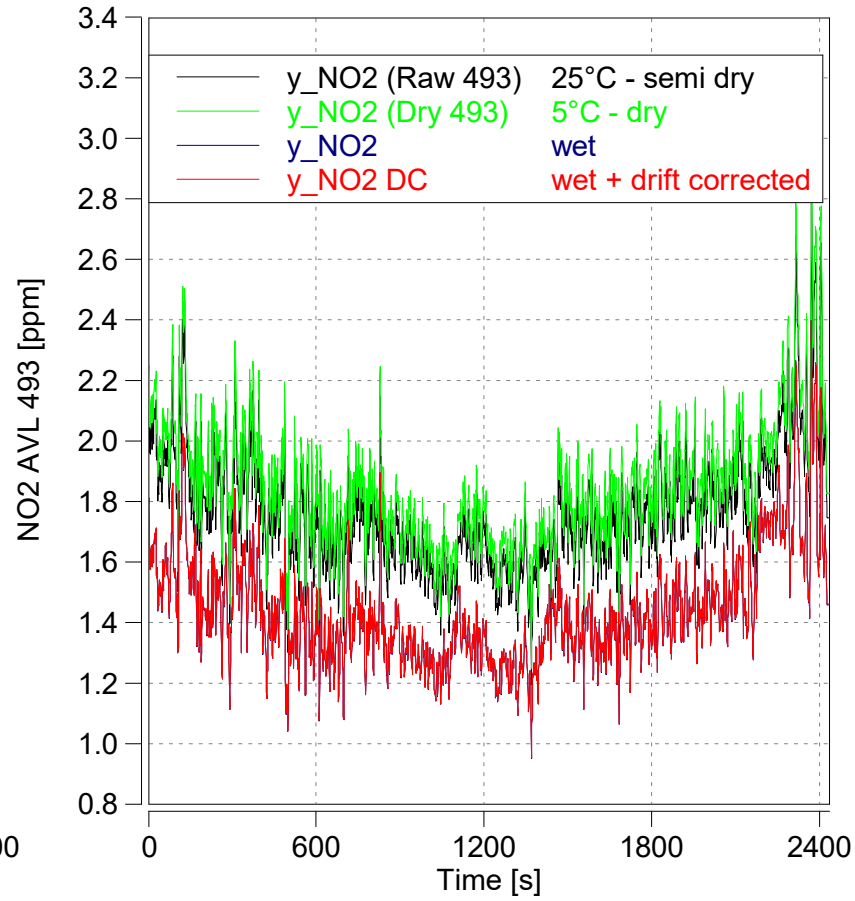
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: Corrected Emissions (3)

'A1 HWY EAST'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019

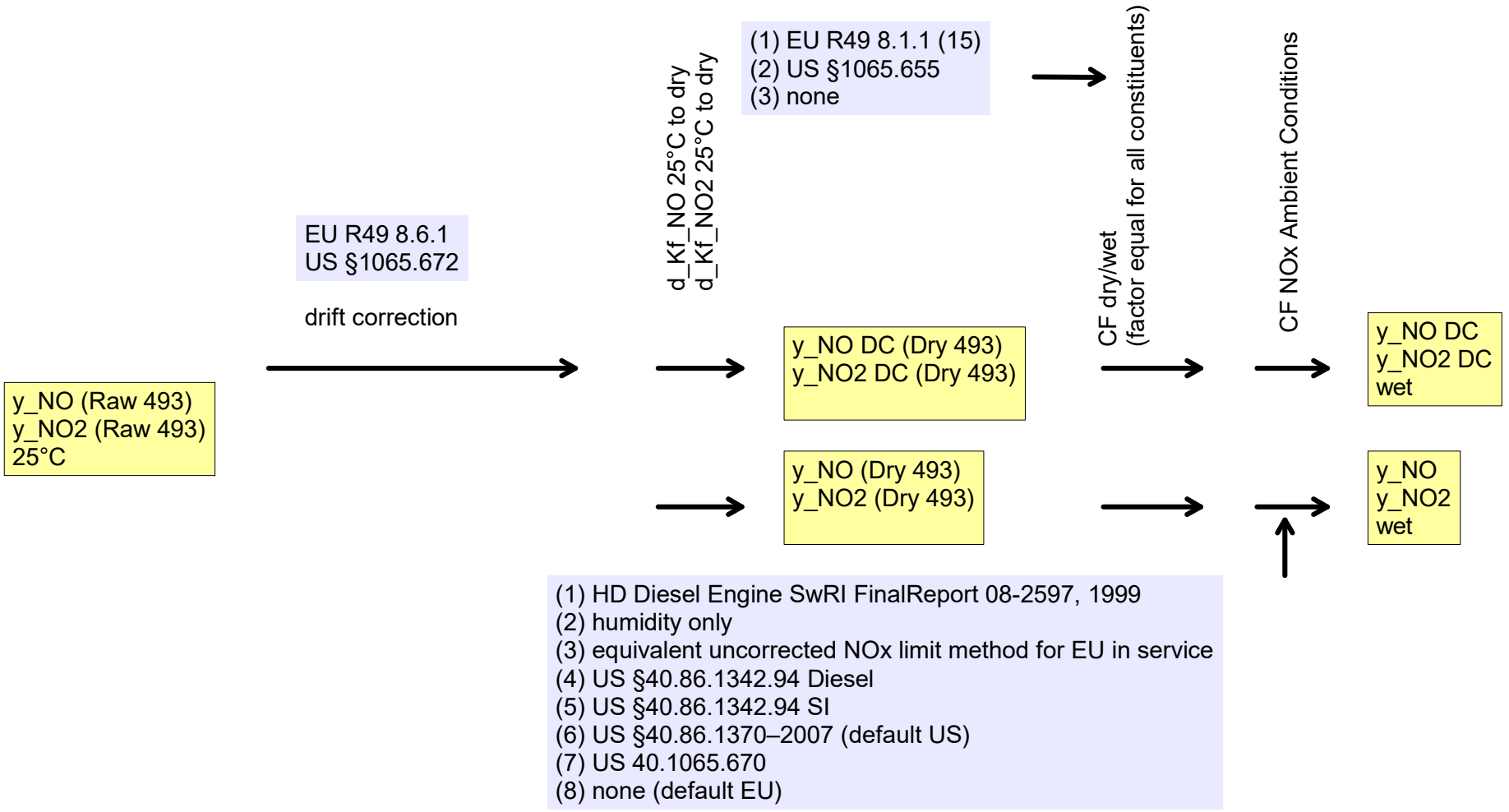



Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

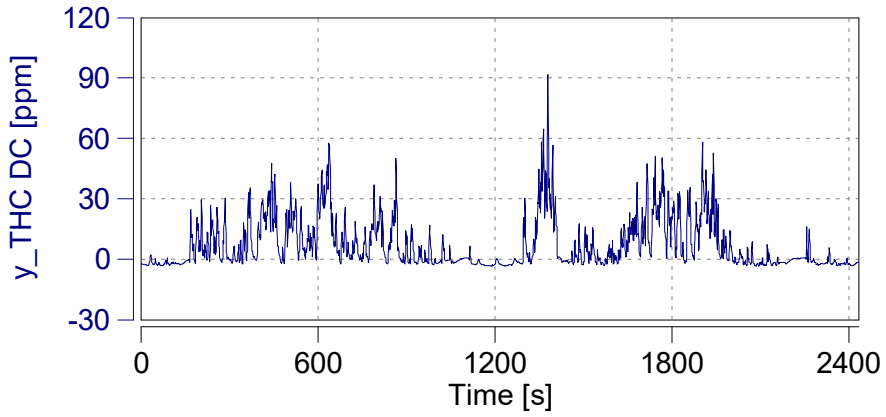
## NOx - AVL 493

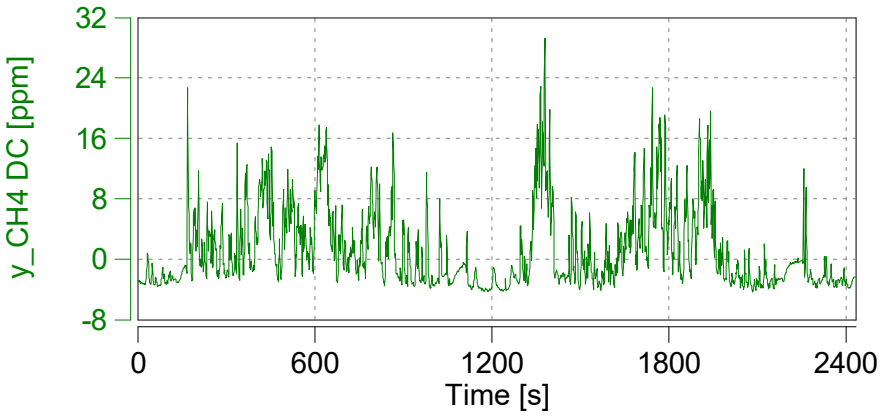

y_NO (Raw 493)
y_NO2 (Raw 493)
25°C
EU R49 8.6.1
US §1065.672
drift correction
d_Kf_NO 25°C to dry
d_Kf_NO2 25°C to dry
(1) EU R49 8.1.1 (15)
(2) US §1065.655
(3) none
y_NO DC (Dry 493)
y_NO2 DC (Dry 493)
y_NO (Dry 493)
y_NO2 (Dry 493)
CF dry/wet
(factor equal for all constituents)
CF NOx Ambient Conditions
y_NO DC
y_NO2 DC
wet
y_NO
y_NO2
wet
(1) HD Diesel Engine SwRI FinalReport 08-2597, 1999
(2) humidity only
(3) equivalent uncorrected NOx limit method for EU in service
(4) US §40.86.1342.94 Diesel
(5) US §40.86.1342.94 SI
(6) US §40.86.1370–2007 (default US)
(7) US 40.1065.670
(8) none (default EU)

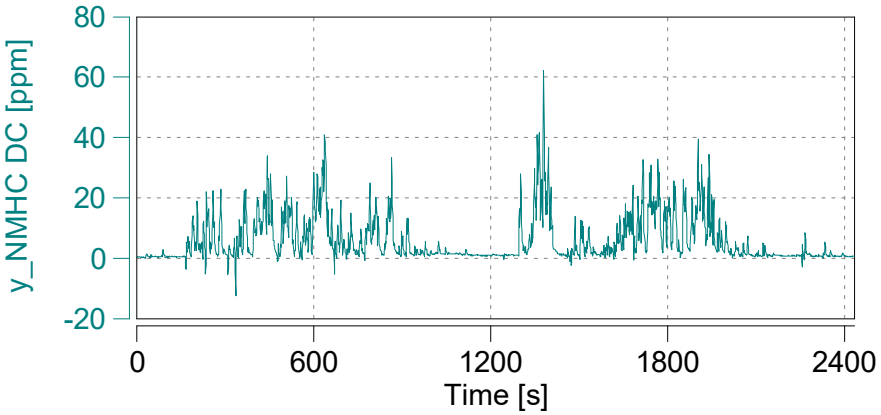
Case: W177-4577
Page: Corrected Emissions (5)

'A1 HWY EAST'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019



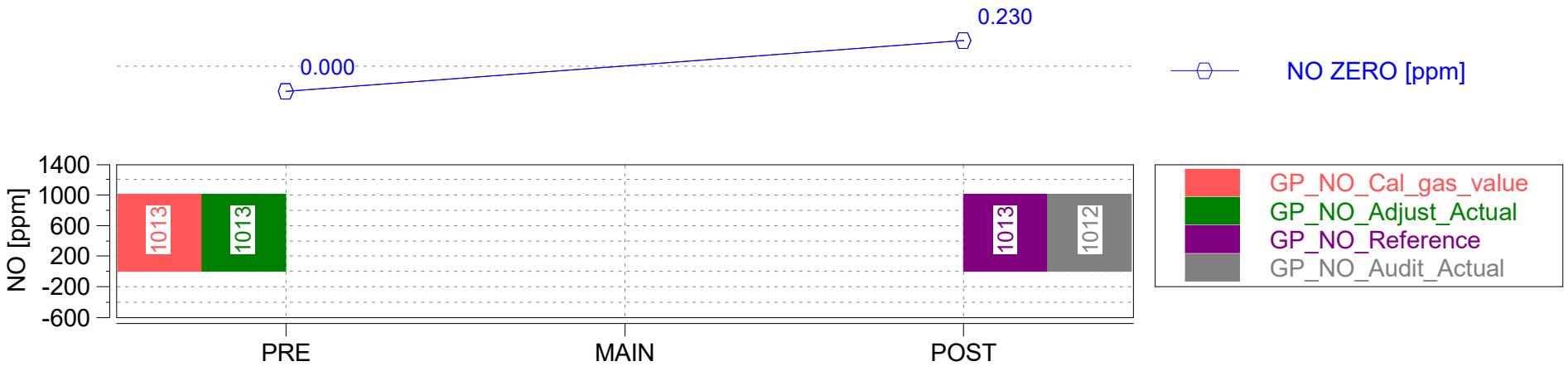

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

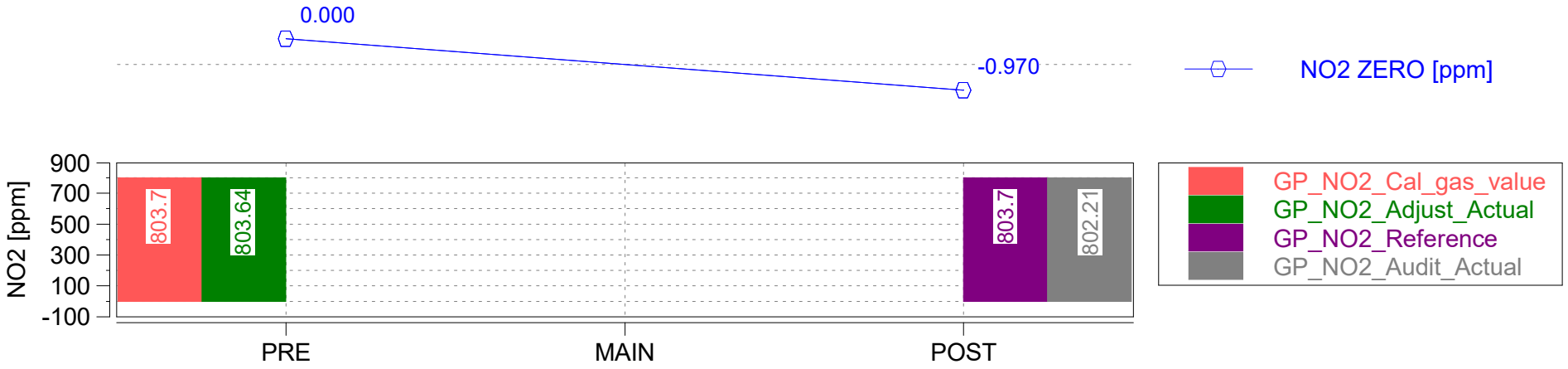
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: NO/NO2/NOx Zero - Span

'A1 HWY EAST'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019



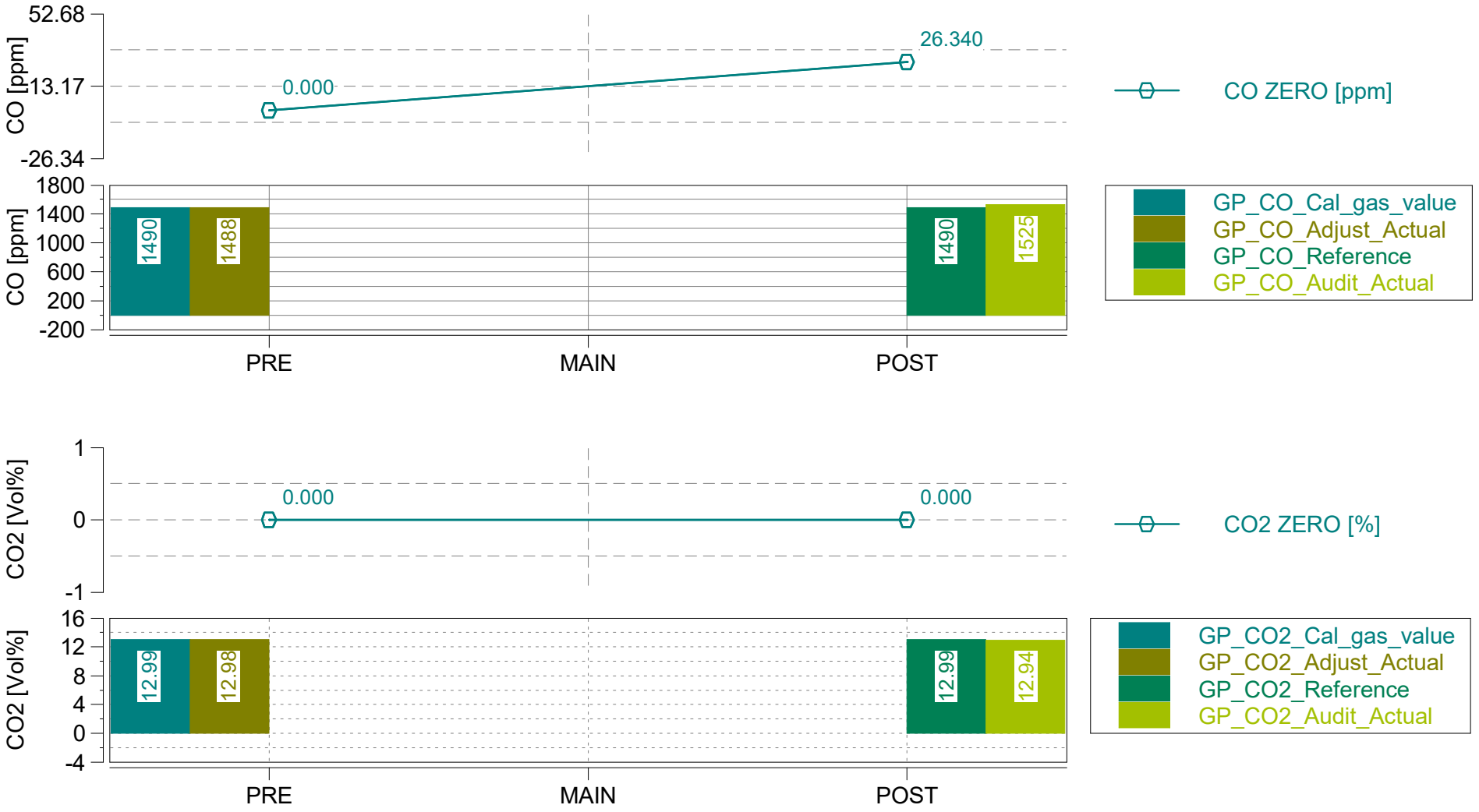

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: CO/CO2 Zero - Span

'A1 HWY EAST'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019



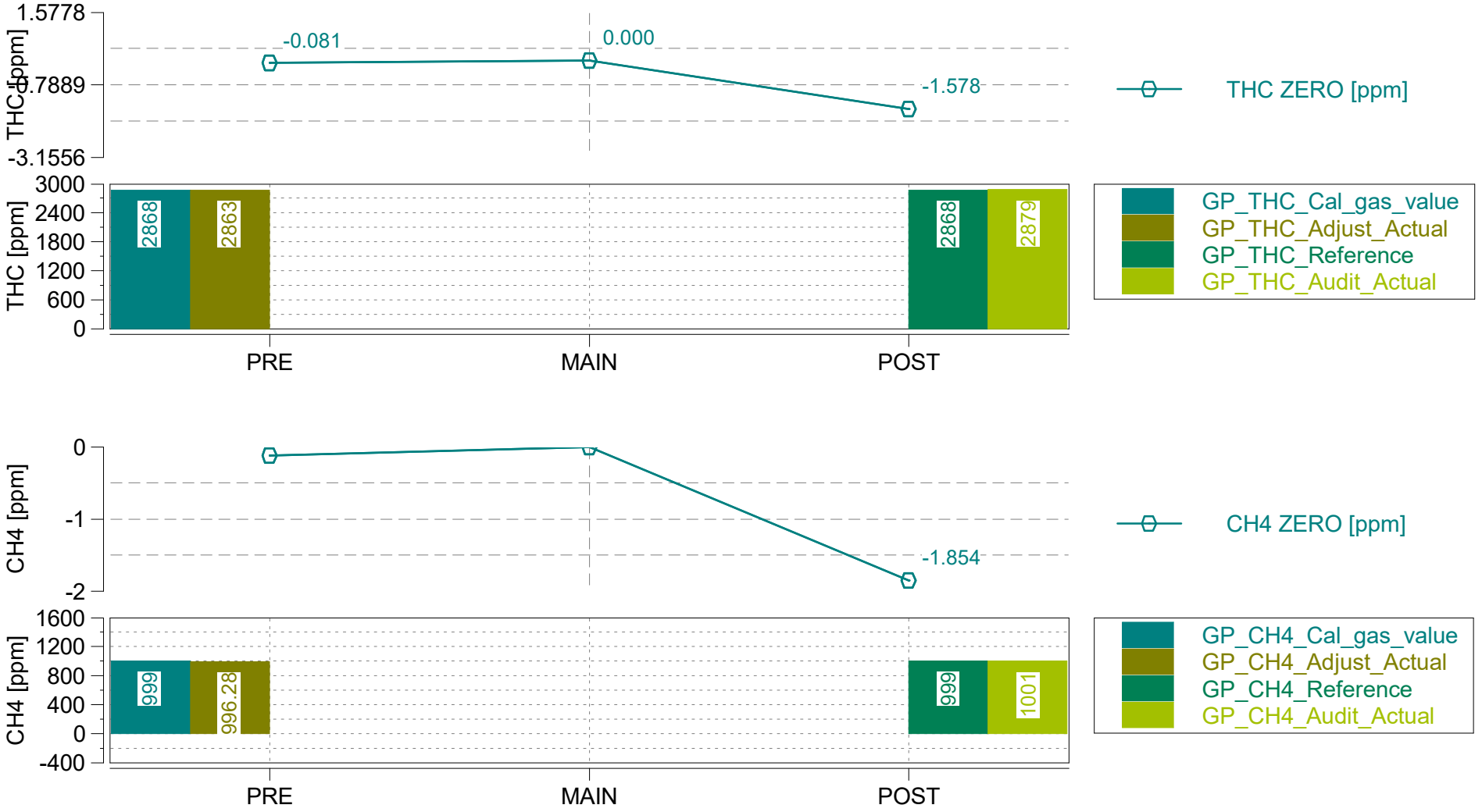

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: THC/CH4 Zero - Span

'A1 HWY EAST'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

| § | criterium | condition | value | unit | pass/fail |
|---|---|---|---|---|---|
| **GAS Leak Check** | The leakage rate on the vacuum side shall not exceed 0.5 per cent of the in-use flow rate for the portion of the system being checked. | The leakage rate <= 0.5% | **0.30** | **%** | pass |
| **PN Leak Check** | n/a | n/a | **n/a** | **n/a** | n/a |
| **PM Leak Check** | n/a | n/a | **n/a** | **n/a** | n/a |

GAS PEMS Devices

| | |
|---|---|
| Device ID | AVL492 |
| Serial Number | 0246 |
| Firmware Version | V1.10 |
| Main Test Date | 2021-02-18 |
| Leak Check Age [days] | 0 |

| | |
|---|---|
| Device ID | AVL4925 |
| Serial Number | 145 |
| Firmware Version | 1.17.0.3 |

EFM

| | |
|---|---|
| Device ID | AVL495 |
| Serial Number | 00826 |
| Serial Number Tube | 01080 |
| Firmware Version | V1.10 |

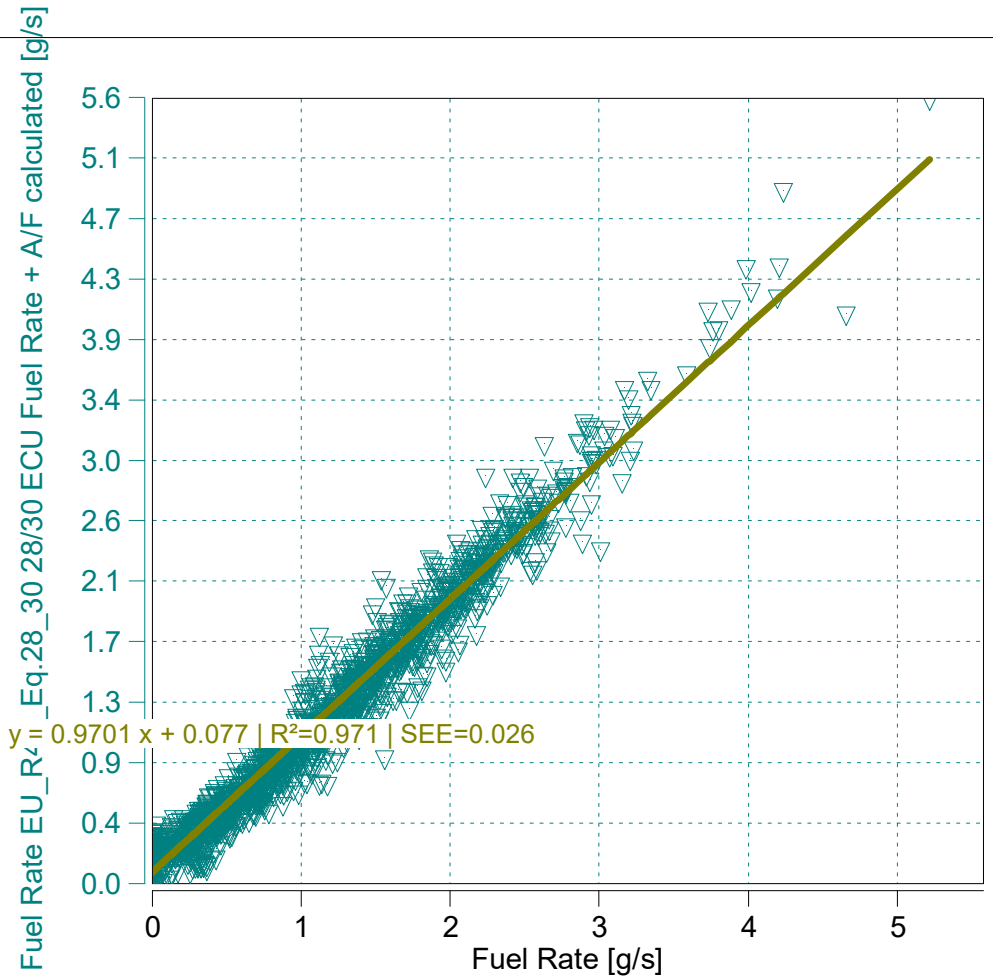
System Control

| | |
|---|---|
| SC Version | V2.6_212 |
| SC Serial Number | 60300923 |

Case: W177-4577
Page: Fuel Rate ECU vs. Calculated

'A1 HWY EAST'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019




EU 582/2011/Appendix I/3.2.1 | Fuel Rate ECU and calculated

y = 0.9701 x + 0.077 | R²=0.971 | SEE=0.026
m = 0.97 (0.9 - 1.1 recommended)
R² = 0.97 (min 0.9 mandatory)

Data from - to [% of Maximum]

0 100

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: Trip Summary

'B2 HWY West'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019

| | | |
|---|---|---|
| Trip Duration | 2006.00 | s |
| Trip Duration (a) | 2006.00 | s |
| Trip Distance | 28.26 | mi |
| Trip Distance (a) | 28.26 | mi |
| | | |
| Trip Fuel Cons. (b) | 1.82 | kg |
| Trip Fuel Cons. (ab) | 1.82 | kg |
| Trip Fuel Cons. EU (ac) | 1.90 | kg |
| Trip Fuel Cons. US (ac) | 1.90 | kg |
| | | |
| Trip Fuel Economy (b) | 43.86 | mpg_US |
| Trip Fuel Economy (ab) | 43.86 | mpg_US |
| Trip Fuel Economy EU (ac) | 42.12 | mpg_US |
| Trip Fuel Economy US (ac) | 42.01 | mpg_US |
| Trip Fuel Economy GGE (b) | 43.86 | mpg_US |
| Trip Fuel Economy GGE (ab) | 43.86 | mpg_US |
| Trip Fuel Economy EU GGE (ac) | 42.12 | mpg_US |
| Trip Fuel Economy US GGE (ac) | 42.01 | mpg_US |
| | | |
| Trip Av. Eng. Speed | 1565.99 | rpm |
| Trip Av. Torque | 51.66 | lbft |
| Trip Av. Power | 17.30 | hp |
| Trip Work | | |
| Trip Work (a) | 9.64 | hphr |
| | | |
| Trip Exhaust Mass | 31.67 | kg |
| Trip Exhaust Mass EU (ac) | 29.21 | kg |
| Trip Exhaust Mass US (ac) | 29.17 | kg |
| | | |
| Trip Av. Amb. Temperature | 72.01 | deg_F |
| Trip Av. Humidity | 12.19 | % |
| Trip Av. GPS Altitude | 213.34 | m |
| | | |
| Fuel Type | Petrol (E10) | |

| | | |
|---|---|---|
| ave THC | 2.29036 | ppm |
| ave NMHC | 3.37763 | ppm |
| ave CH4 | -1.08727 | ppm |
| ave CO | 203.48084 | ppm |
| ave CO2 | 10.67764 | % |
| ave NOx | 8.51803 | ppm |
| ave PM | n/a | mg/m3 |
| ave Soot meas | n/a | mg/m3 |
| ave Soot | n/a | mg/m3 |
| ave PN | n/a | #/cm3 |
| | | |
| tot THC | 0.10216 | g |
| tot NMHC | 0.08193 | g |
| tot CH4 | 0.03384 | g |
| tot CO | 7.51489 | g |
| tot CO2 | 5767.57503 | g |
| tot NO (d) | 0.22542 | g |
| tot NO2 | 0.05818 | g |
| tot NOx | 0.28360 | g |
| tot Soot | n/a | g |
| tot Soot meas | n/a | g |
| tot PM | n/a | g |
| tot PN | n/a | # |
| | | |
| PM measurement type | 0.00000 | - |
| tot Soot on PM filter (estim.) | 0.00000 | mg |
| Soot --> PM simple scaling factor | 1.00000 | - |
| | | |
| Trip Av. Veh. Speed | 50.71334 | mi/hr |
| | | |
| Trip Distance Share Urban | 7.28333 | % distance |
| Trip Distance Share Rural | 14.01376 | % distance |
| Trip Distance Share Motorway | 78.70291 | % distance |

| | | |
|---|---|---|
| BS CO2 | 598.13007 | g/hphr |
| BS CO | 0.77934 | g/hphr |
| BS THC | 0.01059 | g/hphr |
| BS NMHC | 0.00850 | g/hphr |
| BS CH4 | 0.00351 | g/hphr |
| BS NO (d) | 0.02338 | g/hphr |
| BS NO2 | 0.00603 | g/hphr |
| BS NOx | 0.02941 | g/hphr |
| BS Soot | n/a | g/hphr |
| BS Soot meas | n/a | g/hphr |
| BS PM | n/a | g/hphr |
| BS PN | n/a | #/hpr |
| | | |
| DS CO2 | 204.09981 | g/mi |
| DS CO | 0.26593 | g/mi |
| DS THC | 0.00362 | g/mi |
| DS NMHC | 0.00290 | g/mi |
| DS CH4 | 0.00120 | g/mi |
| DS NO (d) | 0.00798 | g/mi |
| DS NO2 | 0.00206 | g/mi |
| DS NOx | 0.01004 | g/mi |
| DS Soot | n/a | g/mi |
| DS Soot meas | n/a | g/mi |
| DS PM | n/a | g/mi |
| DS PN | n/a | #/mi |
| | | |
| FS CO2 | 3163.48206 | g/kg |
| FS CO | 4.12188 | g/kg |
| FS THC | 0.05603 | g/kg |
| FS NMHC | 0.04494 | g/kg |
| FS CH4 | 0.01856 | g/kg |
| FS NO (d) | 0.12364 | g/kg |
| FS NO2 | 0.03191 | g/kg |
| FS NOx | 0.15555 | g/kg |
| FS Soot | n/a | g/kg |
| FS Soot meas | n/a | g/kg |
| FS PM | n/a | g/kg |
| FS PN | n/a | #/kg |

(a) GAS PEMS measurement state only, (b) based on fuel rate input (ECU, Fuel Meter), (c) Based on A/F ratio (eq 28-32 - R49)
(d) NO calculated using molecular weight of NO2, GGE=Gasoline Gallon Equivalents

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

# Case: W177-4577
# Page: Trip Summary Drift Corrected

'B2 HWY West'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019

| | | |
|---|---|---|
| Trip Duration | 2006.00 | s |
| Trip Duration (a) | 2006.00 | s |
| Trip Distance | 28.26 | mi |
| Trip Distance (a) | 28.26 | mi |
| | | |
| Trip Fuel Cons. (b) | 1.82 | kg |
| Trip Fuel Cons. (ab) | 1.82 | kg |
| Trip Fuel Cons. EU (ac) | 1.90 | kg |
| Trip Fuel Cons. US (ac) | 1.90 | kg |
| | | |
| Trip Fuel Economy (b) | 43.86 | mpg_US |
| Trip Fuel Economy (ab) | 43.86 | mpg_US |
| Trip Fuel Economy EU (ac) | 42.12 | mpg_US |
| Trip Fuel Economy US (ac) | 42.01 | mpg_US |
| Trip Fuel Economy GGE (b) | 43.86 | mpg_US |
| Trip Fuel Economy GGE (ab) | 43.86 | mpg_US |
| Trip Fuel Economy EU GGE (ac) | 42.12 | mpg_US |
| Trip Fuel Economy US GGE (ac) | 42.01 | mpg_US |
| | | |
| Trip Av. Eng. Speed | 1565.99 | rpm |
| Trip Av. Torque | 51.66 | lbft |
| Trip Av. Power | 17.30 | hp |
| Trip Work | | |
| Trip Work (a) | 9.64 | hphr |
| | | |
| Trip Exhaust Mass | 31.67 | kg |
| Trip Exhaust Mass EU (ac) | 29.21 | kg |
| Trip Exhaust Mass US (ac) | 29.17 | kg |
| | | |
| Trip Av. Amb. Temperature | 72.01 | deg_F |
| Trip Av. Humidity | 12.19 | % |
| Trip Av. GPS Altitude | 213.34 | m |
| | | |
| Fuel Type | Petrol (E10) | |

| | | |
|---|---|---|
| ave THC DC | 2.32822 | ppm |
| ave NMHC DC | 3.35591 | ppm |
| ave CH4 DC | -1.02769 | ppm |
| ave CO DC | 201.20546 | ppm |
| ave CO2 DC | 10.70236 | % |
| ave NOx DC | 8.52044 | ppm |
| ave PM | n/a | mg/m3 |
| ave Soot meas | n/a | mg/m3 |
| ave Soot | n/a | mg/m3 |
| ave PN DC | | |
| | | |
| tot THC DC | 0.10239 | g |
| tot NMHC DC | 0.08157 | g |
| tot CH4 DC | 0.03419 | g |
| tot CO DC | 7.43086 | g |
| tot CO2 DC | 5780.92590 | g |
| tot NO DC (d) | 0.22546 | g |
| tot NO2 DC | 0.05824 | g |
| tot NOx DC | 0.28370 | g |
| tot Soot | n/a | g |
| tot Soot meas | n/a | g |
| tot PM | n/a | g |
| tot PN DC | | |
| | | |
| PM measurement type | 0.00000 | - |
| tot Soot on PM filter (estim.) | 0.00000 | mg |
| Soot --> PM simple scaling factor | 1.00000 | - |
| | | |
| Trip Av. Veh. Speed | 50.71334 | mi/hr |
| | | |
| Trip Distance Share Urban | 7.28333 | % distance |
| Trip Distance Share Rural | 14.01376 | % distance |
| Trip Distance Share Motorway | 78.70291 | % distance |

| | | |
|---|---|---|
| BS CO2 DC | 599.51463 | g/hphr |
| BS CO DC | 0.77062 | g/hphr |
| BS THC DC | 0.01062 | g/hphr |
| BS NMHC DC | 0.00846 | g/hphr |
| BS CH4 DC | 0.00355 | g/hphr |
| BS NO DC (d) | 0.02338 | g/hphr |
| BS NO2 DC | 0.00604 | g/hphr |
| BS NOx DC | 0.02942 | g/hphr |
| BS Soot | n/a | g/hphr |
| BS Soot meas | n/a | g/hphr |
| BS PM | n/a | g/hphr |
| BS PN DC | | |
| | | |
| DS CO2 DC | 204.57227 | g/mi |
| DS CO DC | 0.26296 | g/mi |
| DS THC DC | 0.00362 | g/mi |
| DS NMHC DC | 0.00289 | g/mi |
| DS CH4 DC | 0.00121 | g/mi |
| DS NO DC (d) | 0.00798 | g/mi |
| DS NO2 DC | 0.00206 | g/mi |
| DS NOx DC | 0.01004 | g/mi |
| DS Soot | n/a | g/mi |
| DS Soot meas | n/a | g/mi |
| DS PM | n/a | g/mi |
| DS PN DC | | |
| | | |
| FS CO2 DC | 3170.80494 | g/kg |
| FS CO DC | 4.07579 | g/kg |
| FS THC DC | 0.05616 | g/kg |
| FS NMHC DC | 0.04474 | g/kg |
| FS CH4 DC | 0.01875 | g/kg |
| FS NO DC (d) | 0.12366 | g/kg |
| FS NO2 DC | 0.03194 | g/kg |
| FS NOx DC | 0.15561 | g/kg |
| FS Soot | n/a | g/kg |
| FS Soot meas | n/a | g/kg |
| FS PM | n/a | g/kg |
| FS PN DC | | |

(a) GAS PEMS measurement state only, (b) based on fuel rate input (ECU, Fuel Meter), (c) Based on A/F ratio (eq 28-32 - R49)
(d) NO calculated using molecular weight of NO2, GGE=Gasoline Gallon Equivalents

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

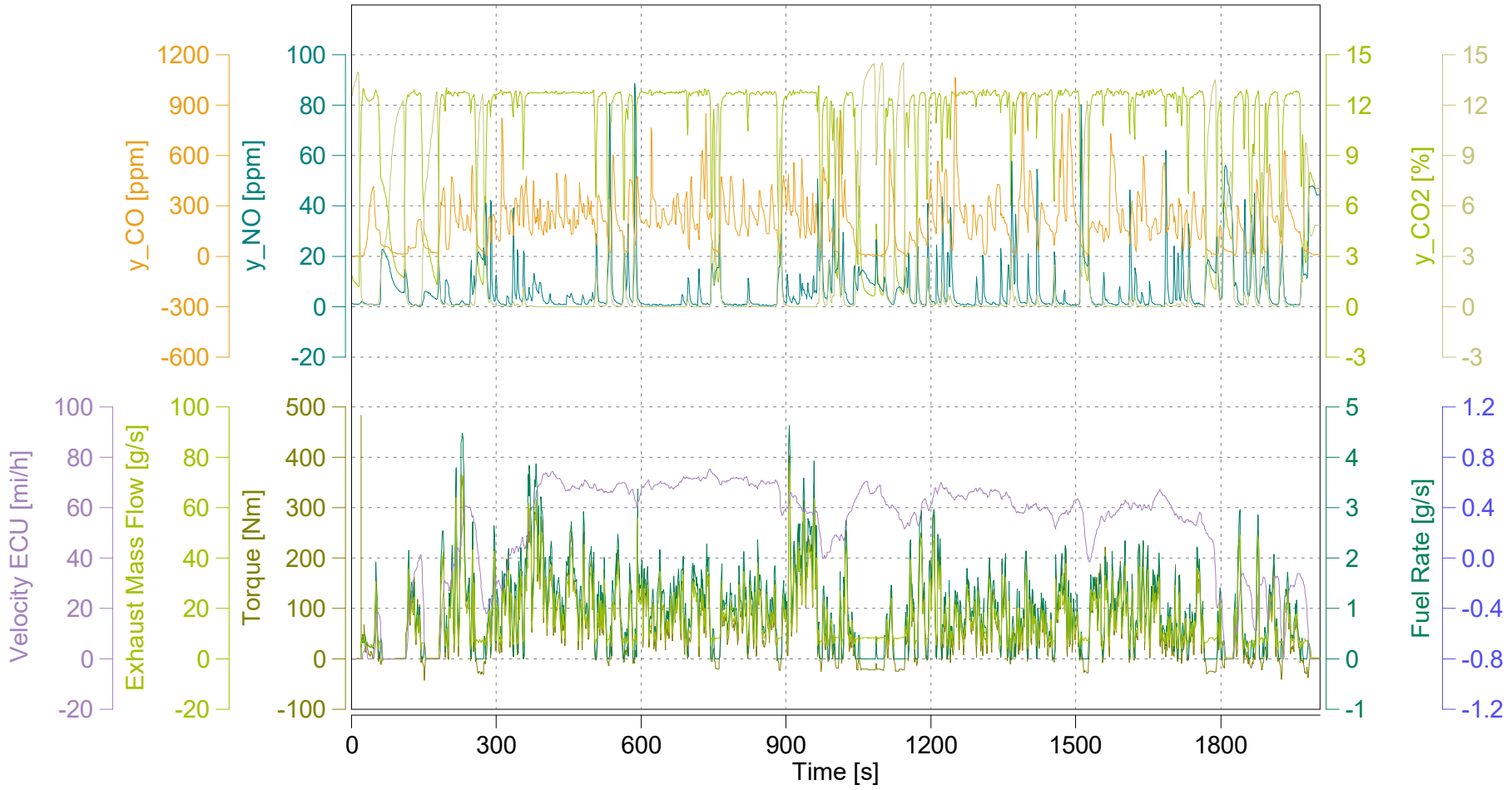
Case: W177-4577
Page: Time Alignment Check

'B2 HWY West'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto

Absolute Time

y_THC
y_NO
y_CO2
y_O2
c_Soot
Fuel Rate
Exhaust Mass
Torque
Velocity ECU




AVL 492 Defa

THC
NO/NO2
CO/CO2
O2

Apply Defa

Alignment Plo

Reset Time
Reset Al
Apply Curr

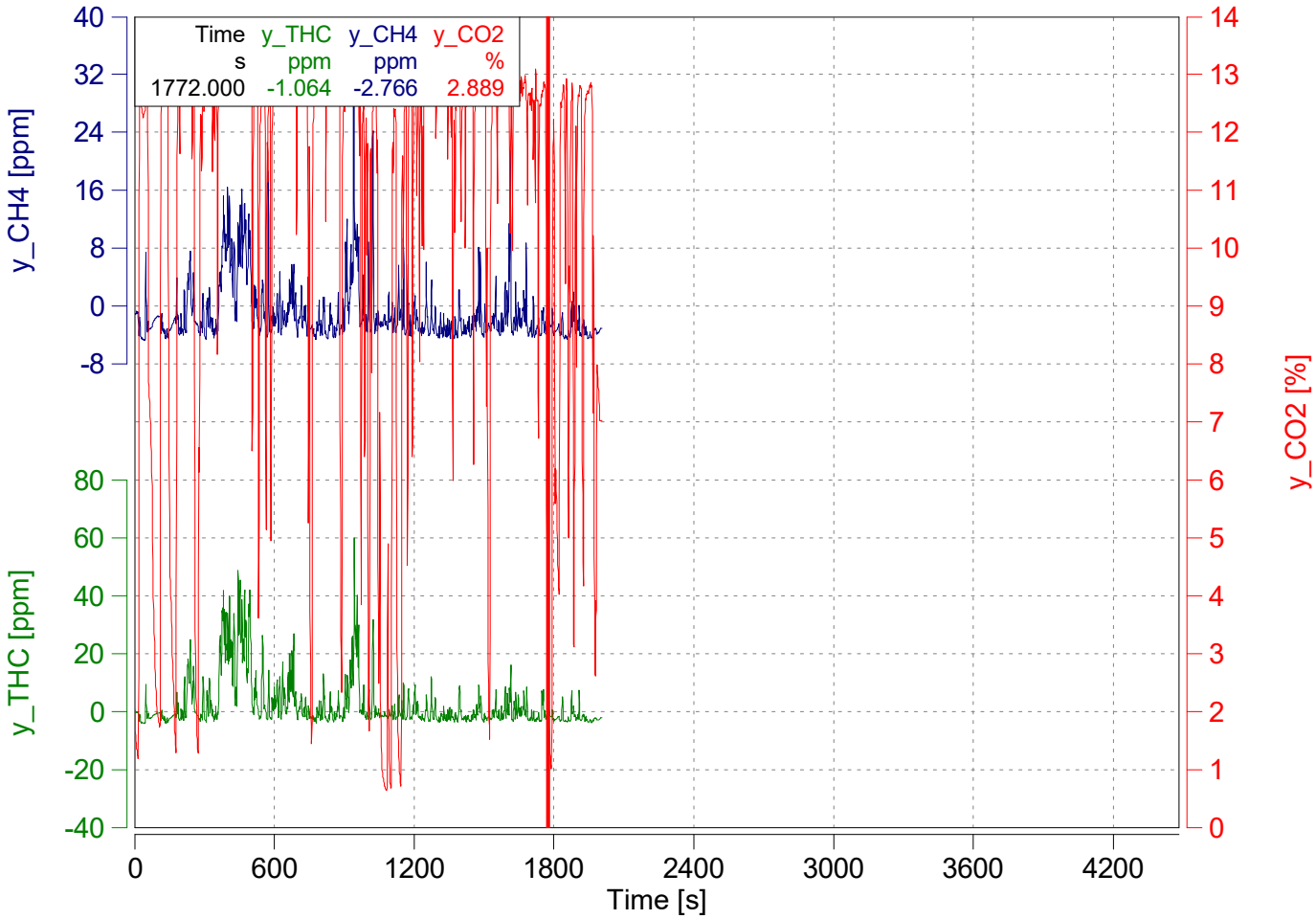
Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: Time Alignment of Gas Concentrations

'B2 HWY West'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019




Absolute Time Shifts

| | | |
|---|---|---|
| y_THC | s | -5.2 |
| y_CH4 | s | -7.2 |

Reset Time Shifts in Plot

Apply Current Values

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

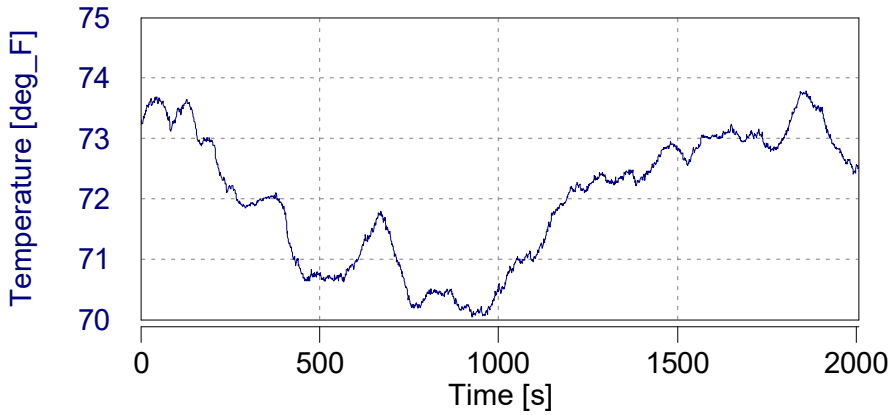
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

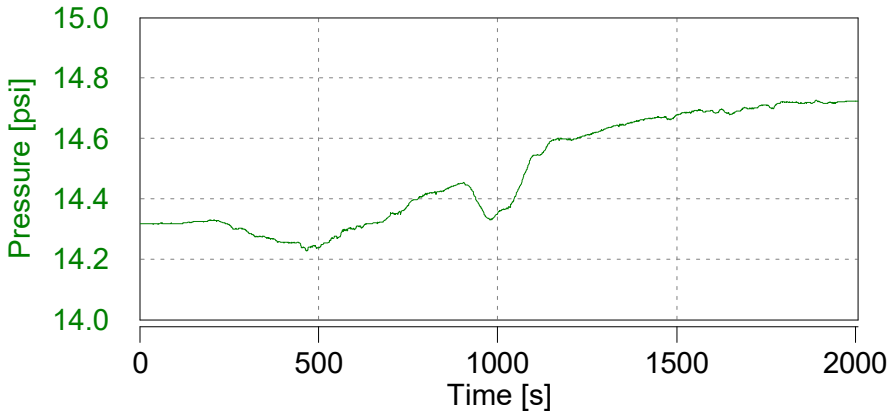
Case: W177-4577
Page: Ambient Conditions

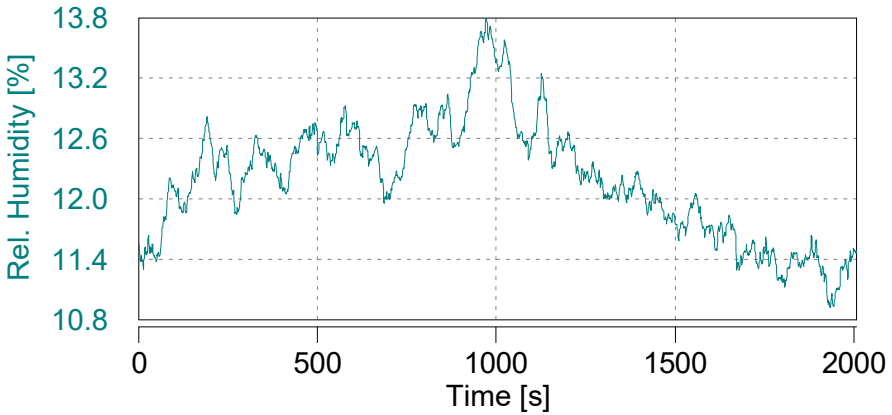
'B2 HWY West'
Start Date: 02/18/2021
Start Time: 10:14:32.0

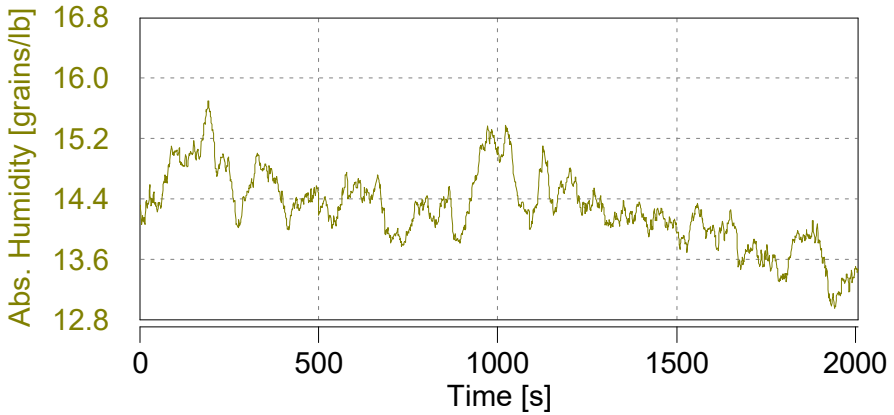
AVL

Concerto M.O.V.E, 2019



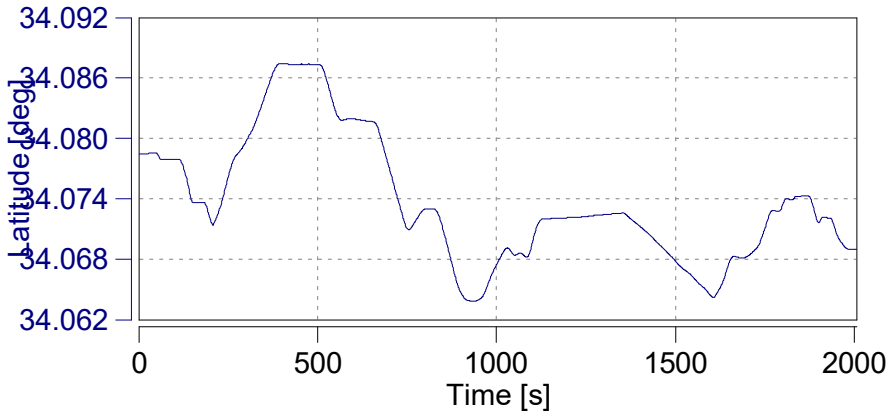

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

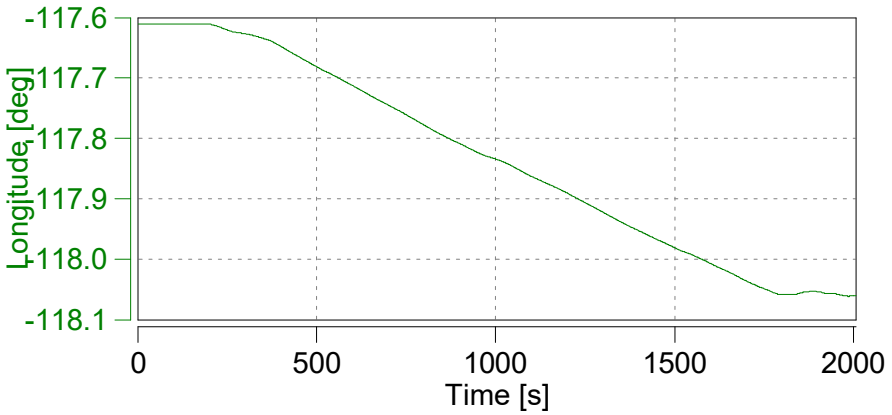
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

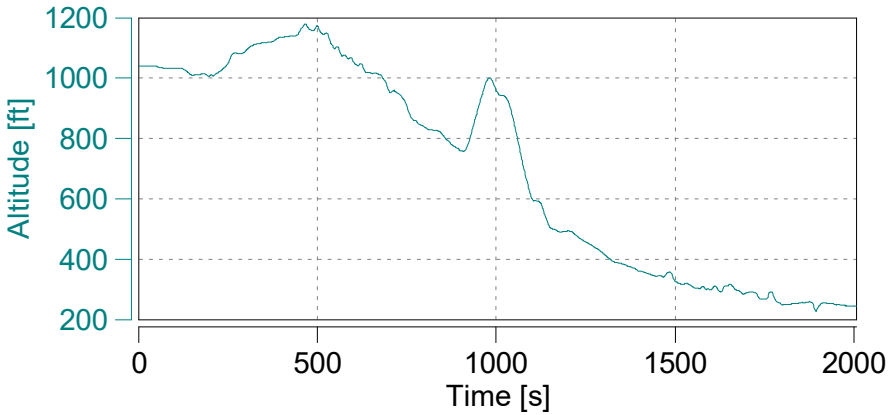
Case: W177-4577
Page: GPS

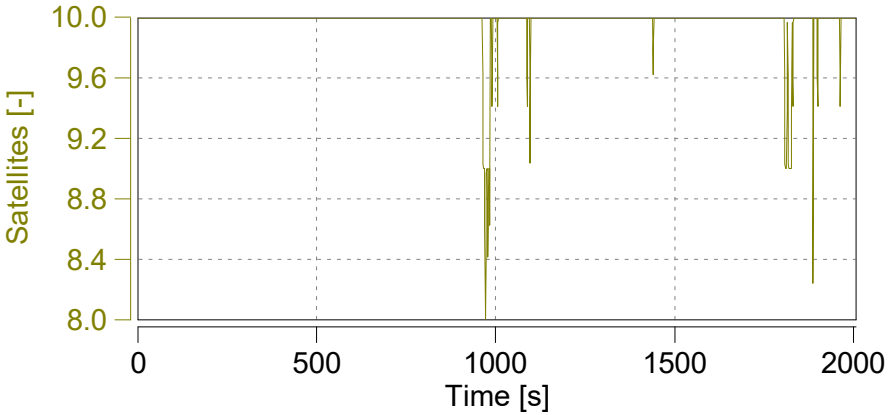
'B2 HWY West'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

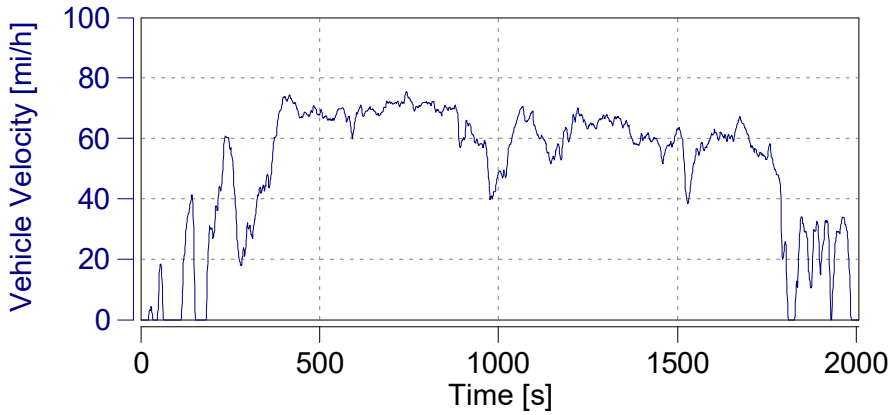
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

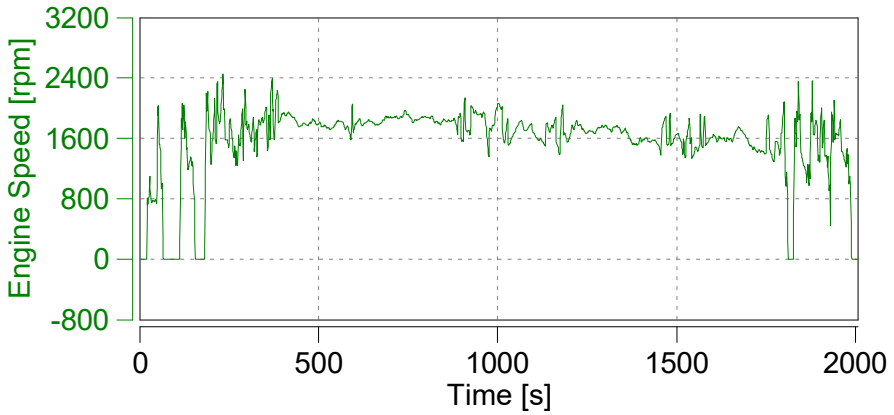
Case: W177-4577
Page: Engine (1)

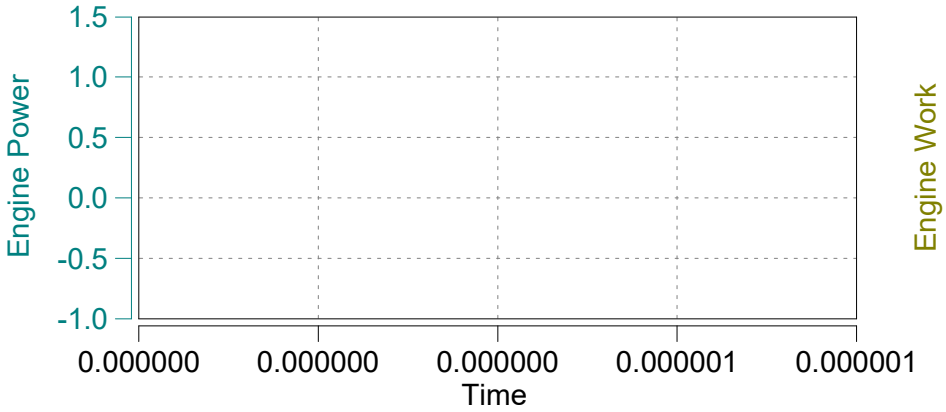
'B2 HWY West'
Start Date: 02/18/2021
Start Time: 10:14:32.0

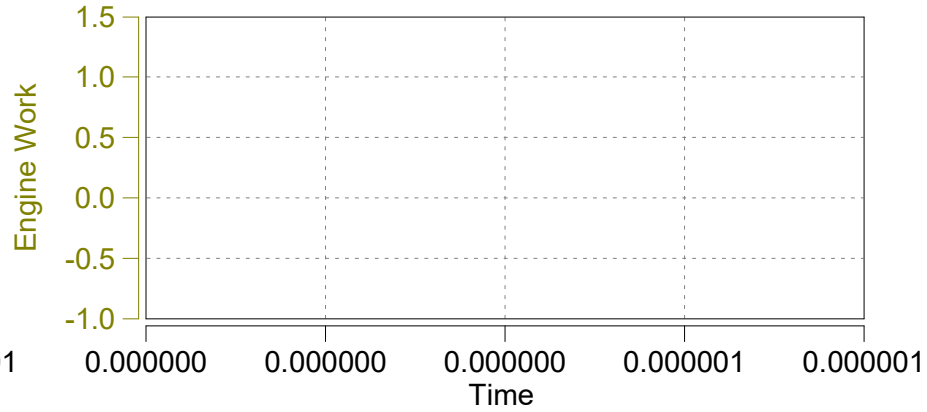
AVL

Concerto M.O.V.E, 2019



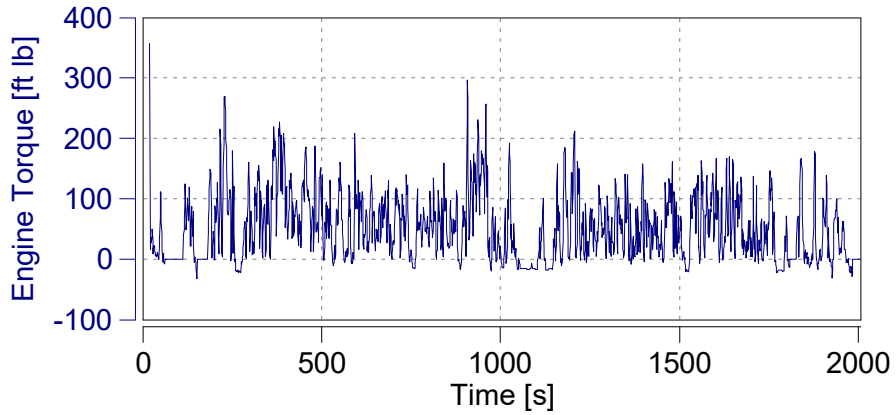

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

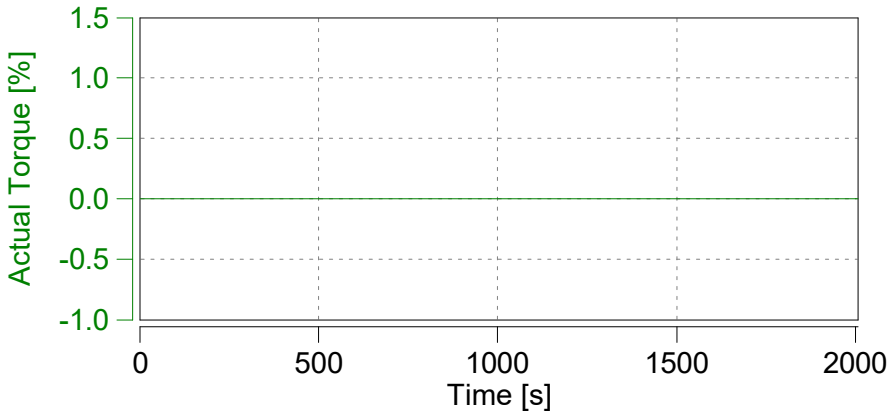
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

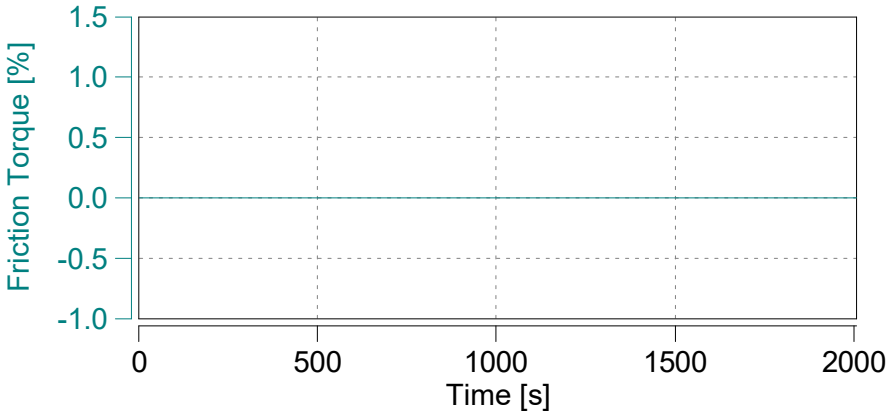
'B2 HWY West'
Start Date: 02/18/2021
Start Time: 10:14:32.0

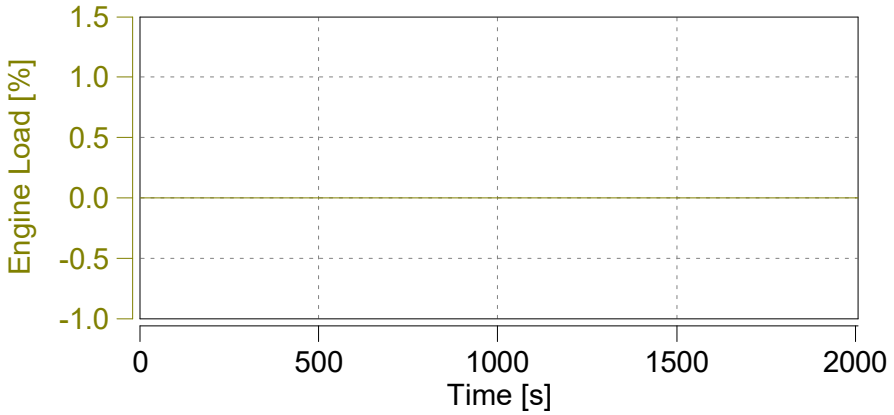
AVL

Concerto M.O.V.E, 2019



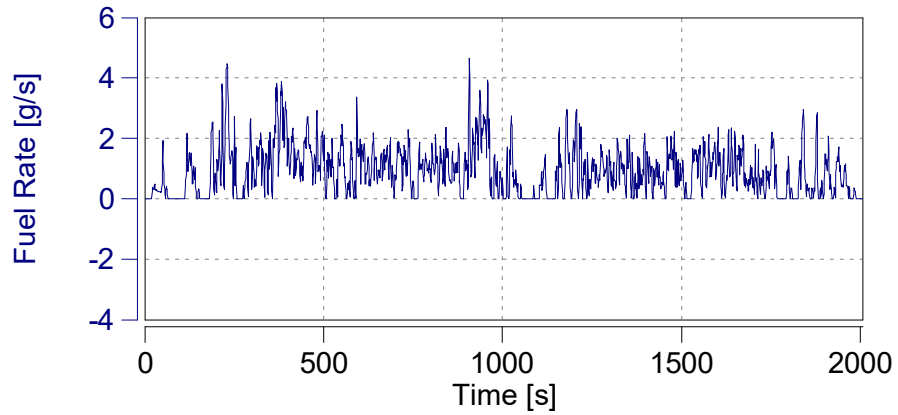



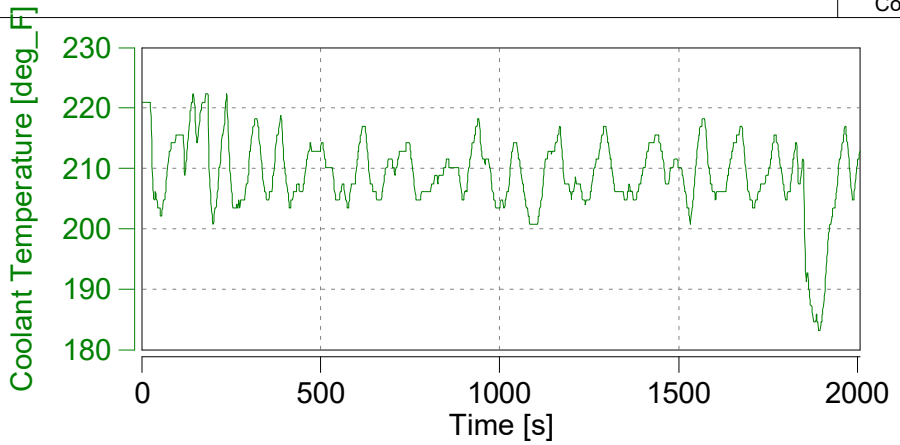



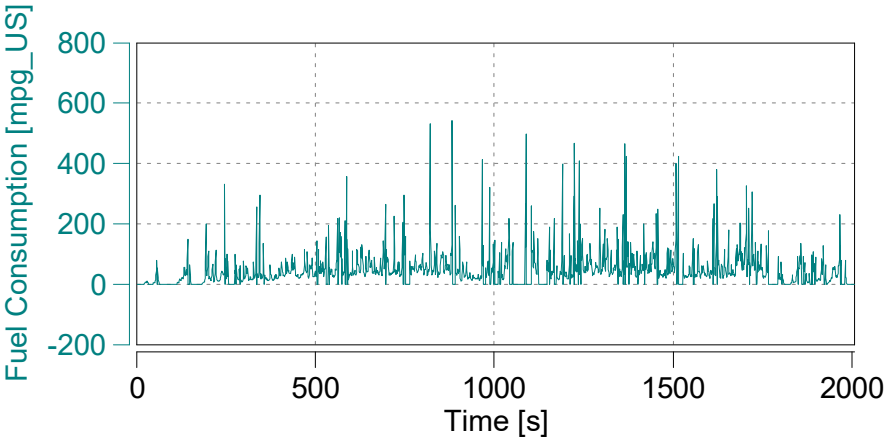
'B2 HWY West'
Start Date: 02/18/2021
Start Time: 10:14:32.0

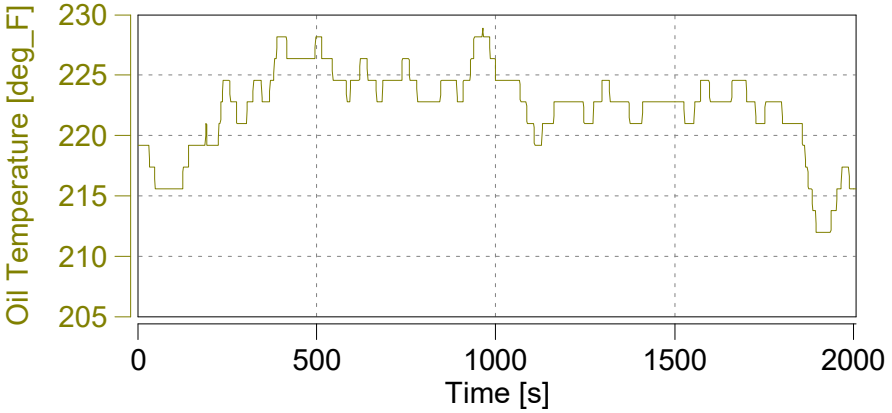
AVL

Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

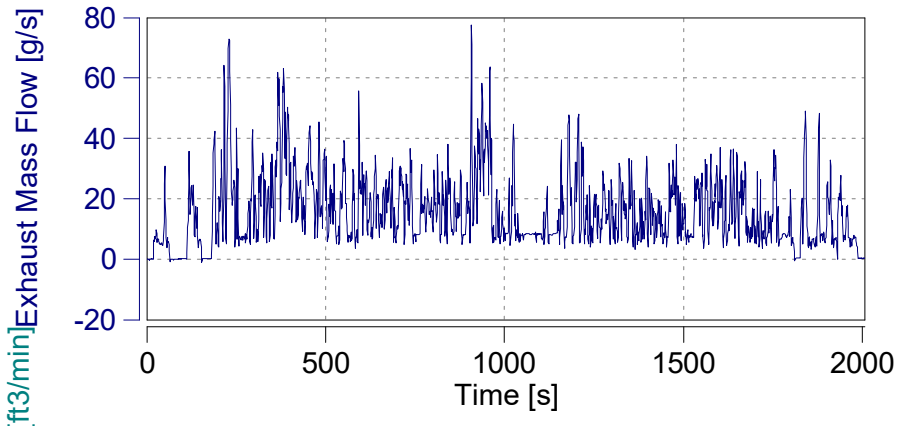
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

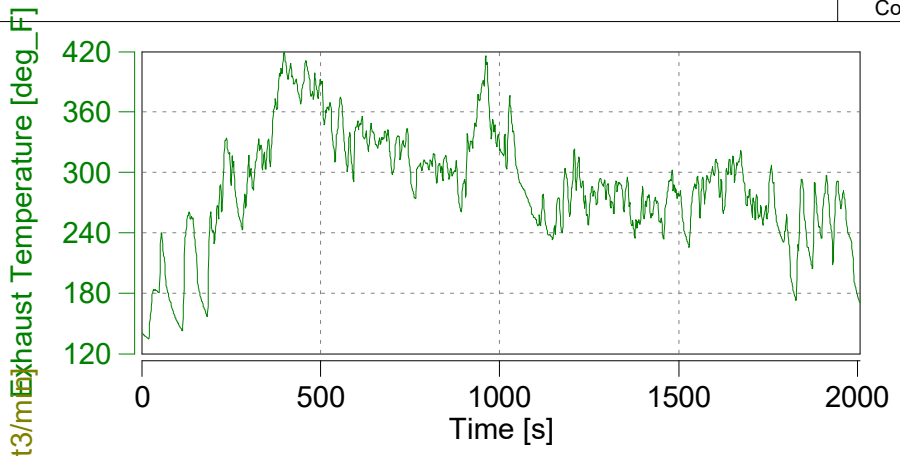
Case: W177-4577
Page: Exhaust Flow (1)

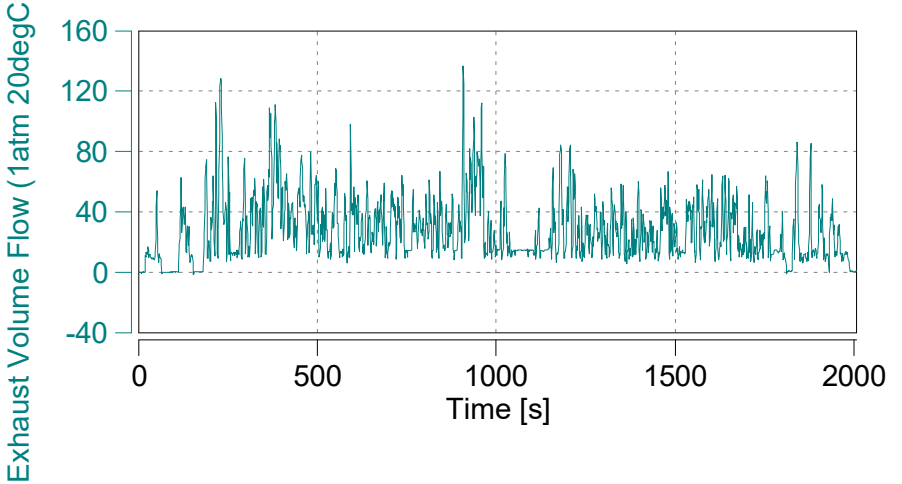
'B2 HWY West'
Start Date: 02/18/2021
Start Time: 10:14:32.0

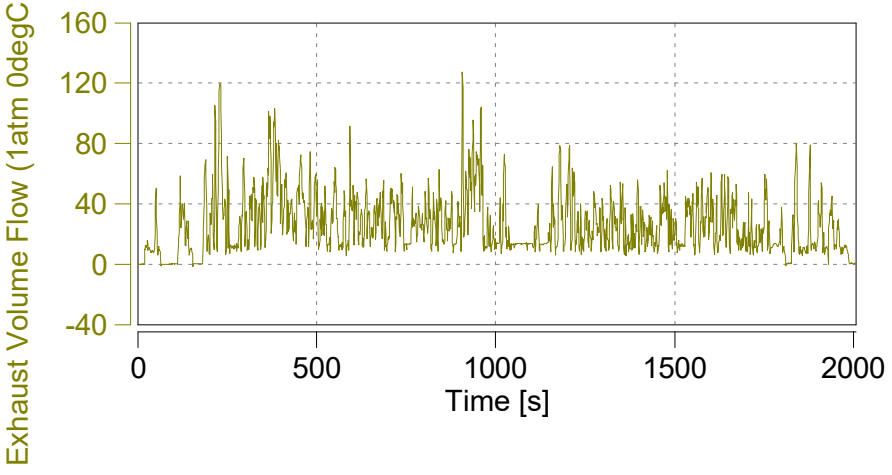
AVL

Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

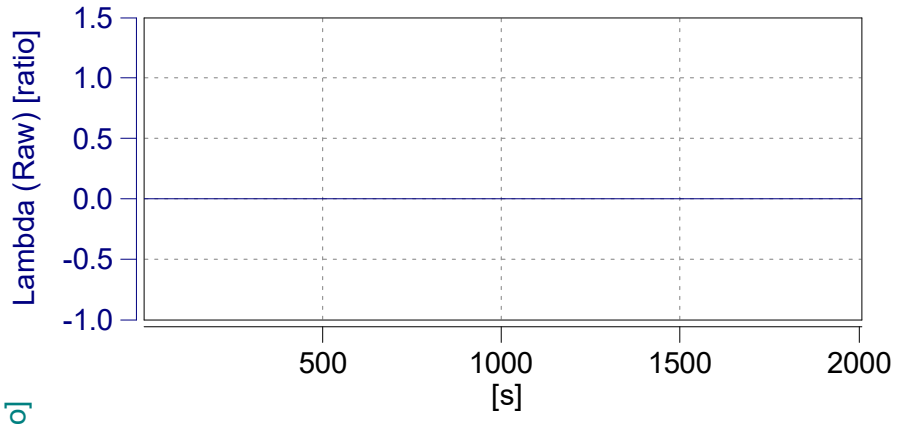
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

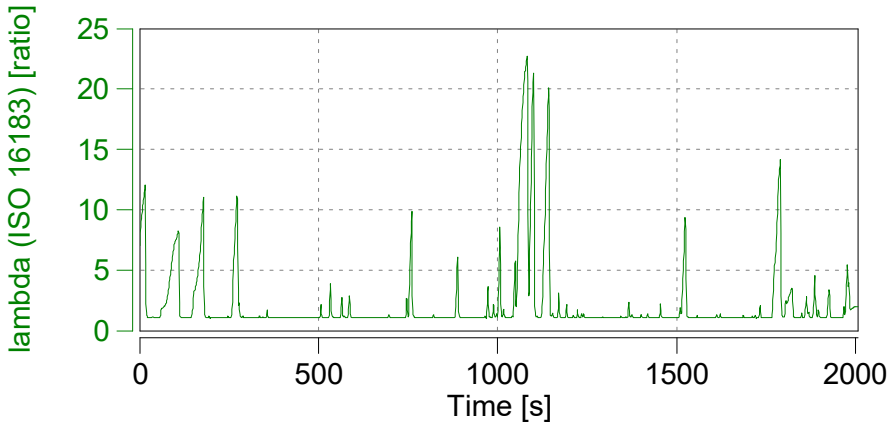
Case: W177-4577
Page: Exhaust Flow (2)

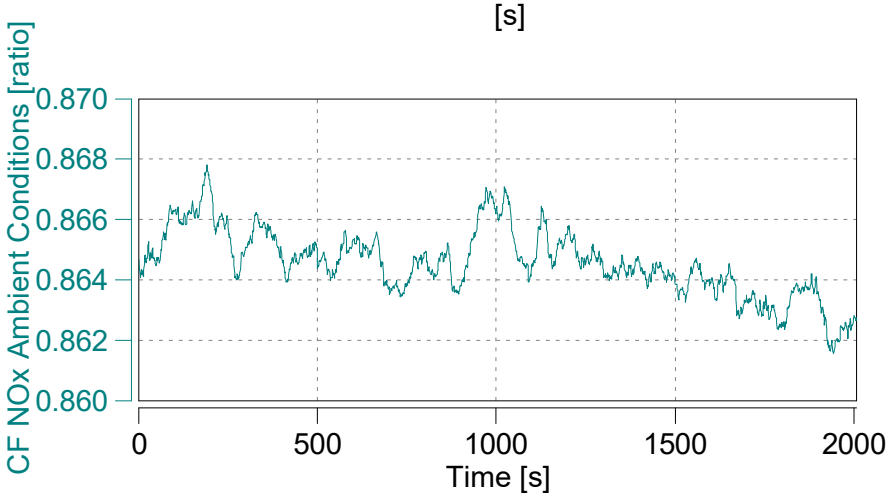
'B2 HWY West'
Start Date: 02/18/2021
Start Time: 10:14:32.0

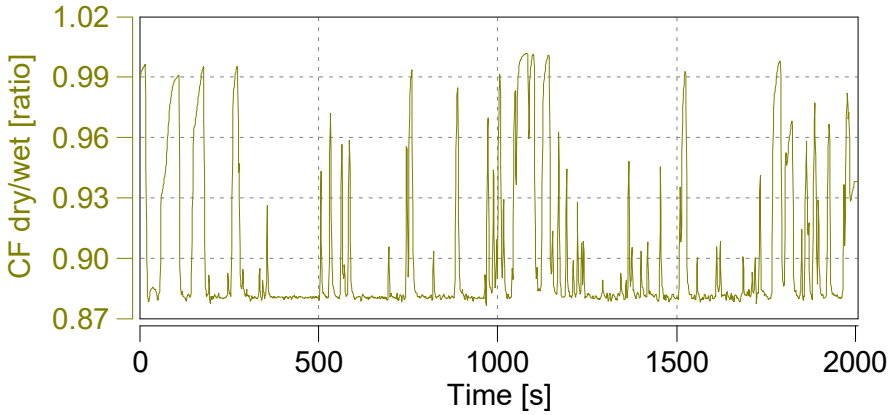
AVL

Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

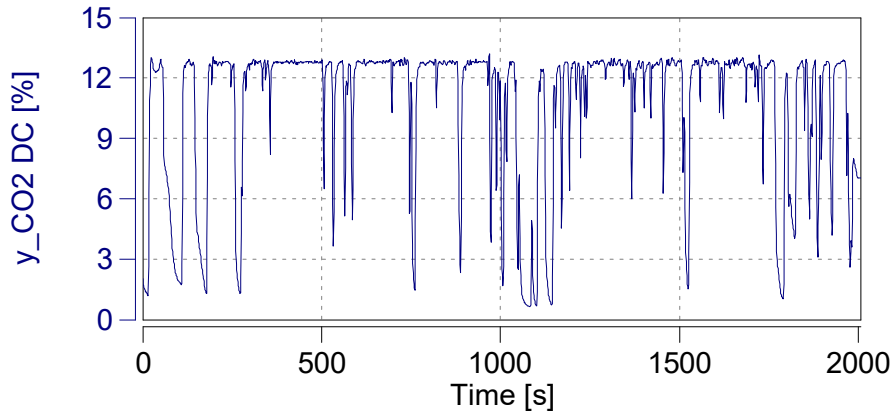
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

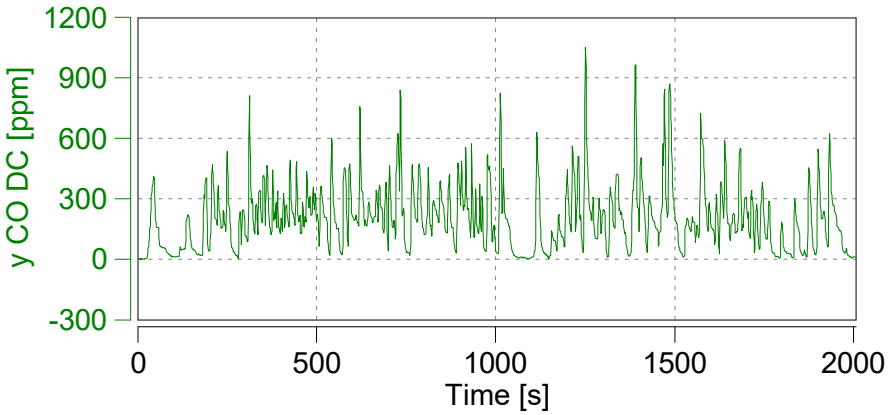
Case: W177-4577
Page: Corrected Emissions (1)

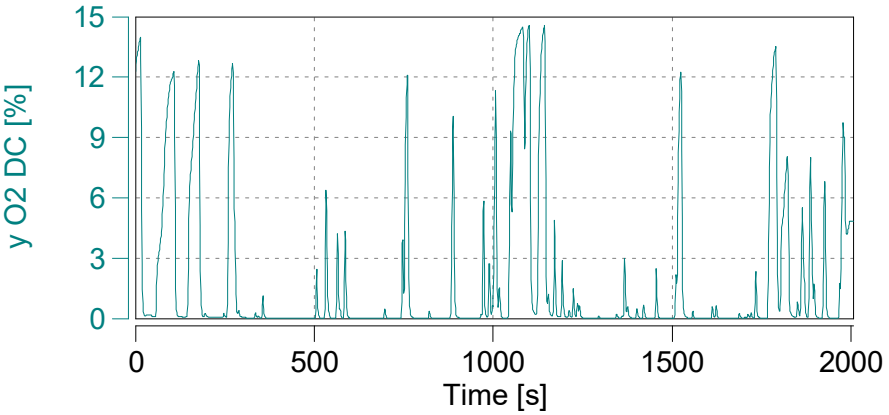
'B2 HWY West'
Start Date: 02/18/2021
Start Time: 10:14:32.0

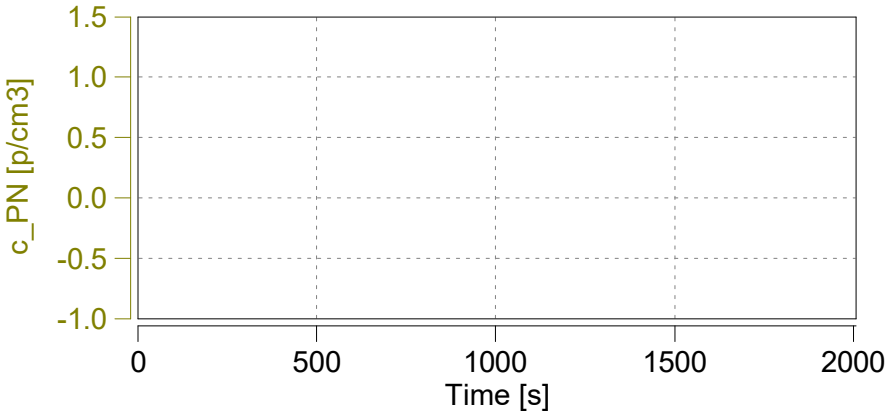
AVL

Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

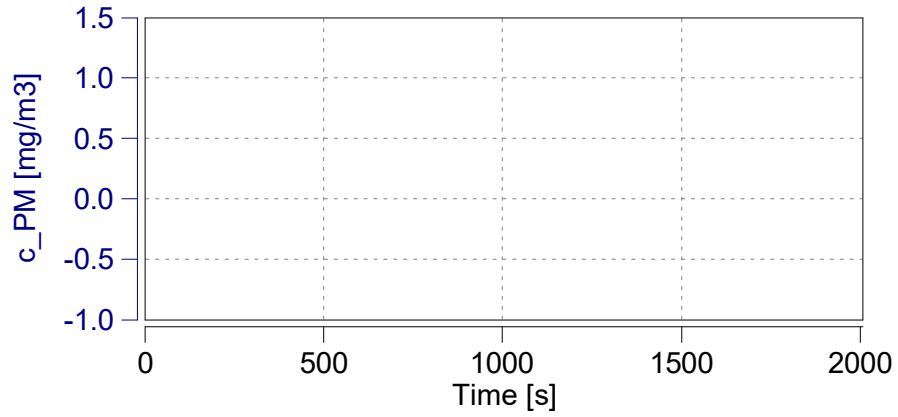
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

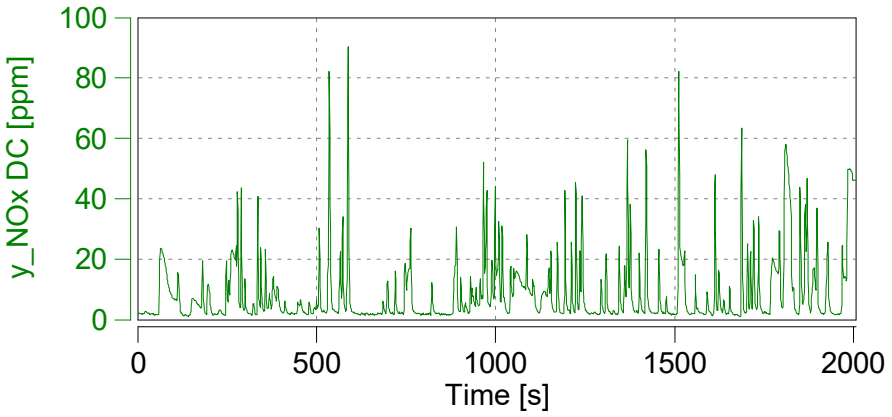
Case: W177-4577
Page: Corrected Emissions (2)

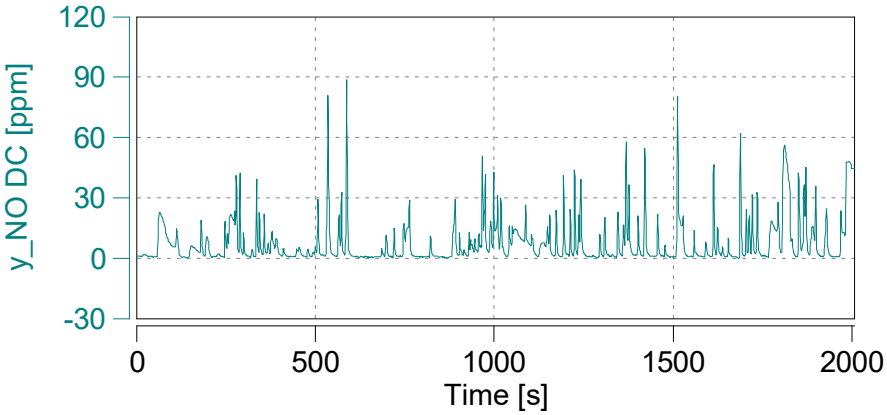
'B2 HWY West'
Start Date: 02/18/2021
Start Time: 10:14:32.0

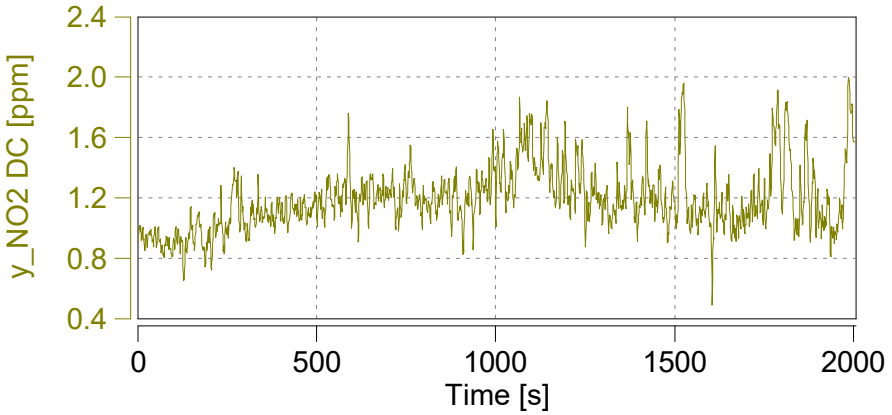
AVL

Concerto M.O.V.E, 2019



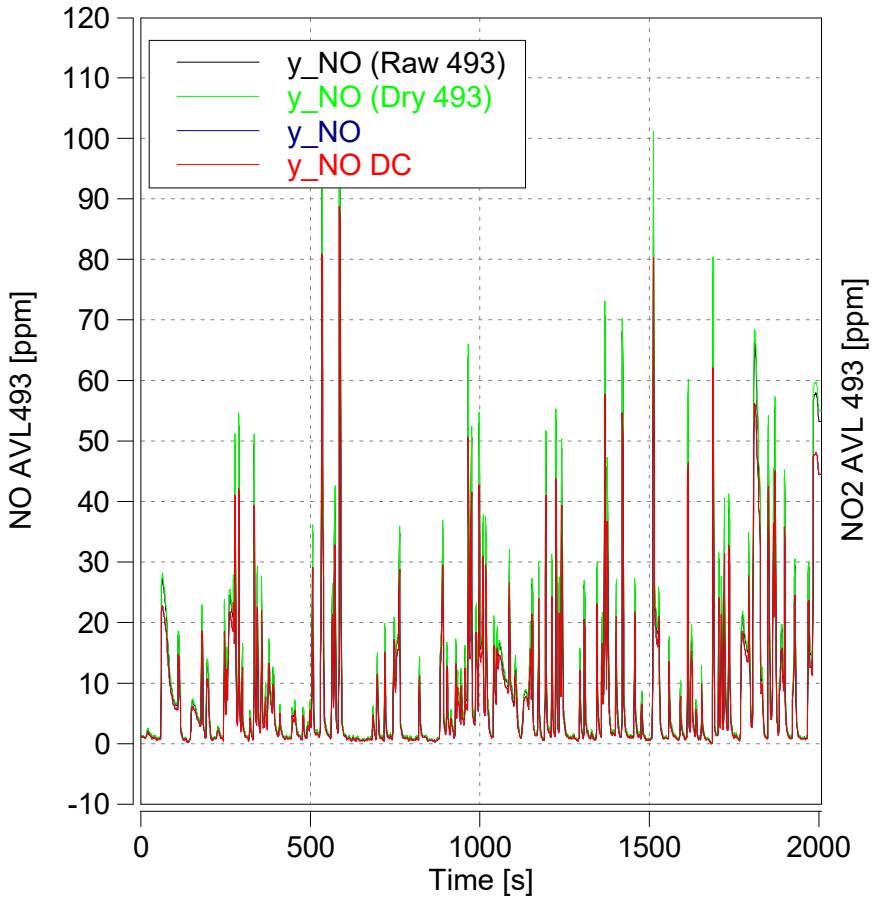

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

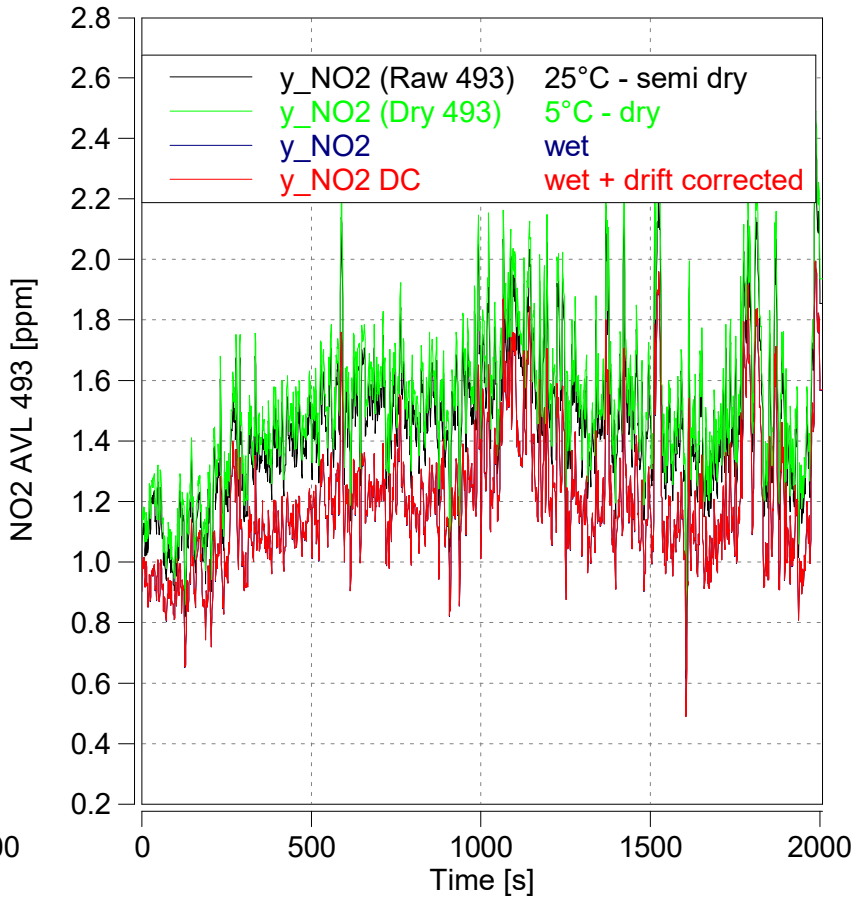
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: Corrected Emissions (3)

'B2 HWY West'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019

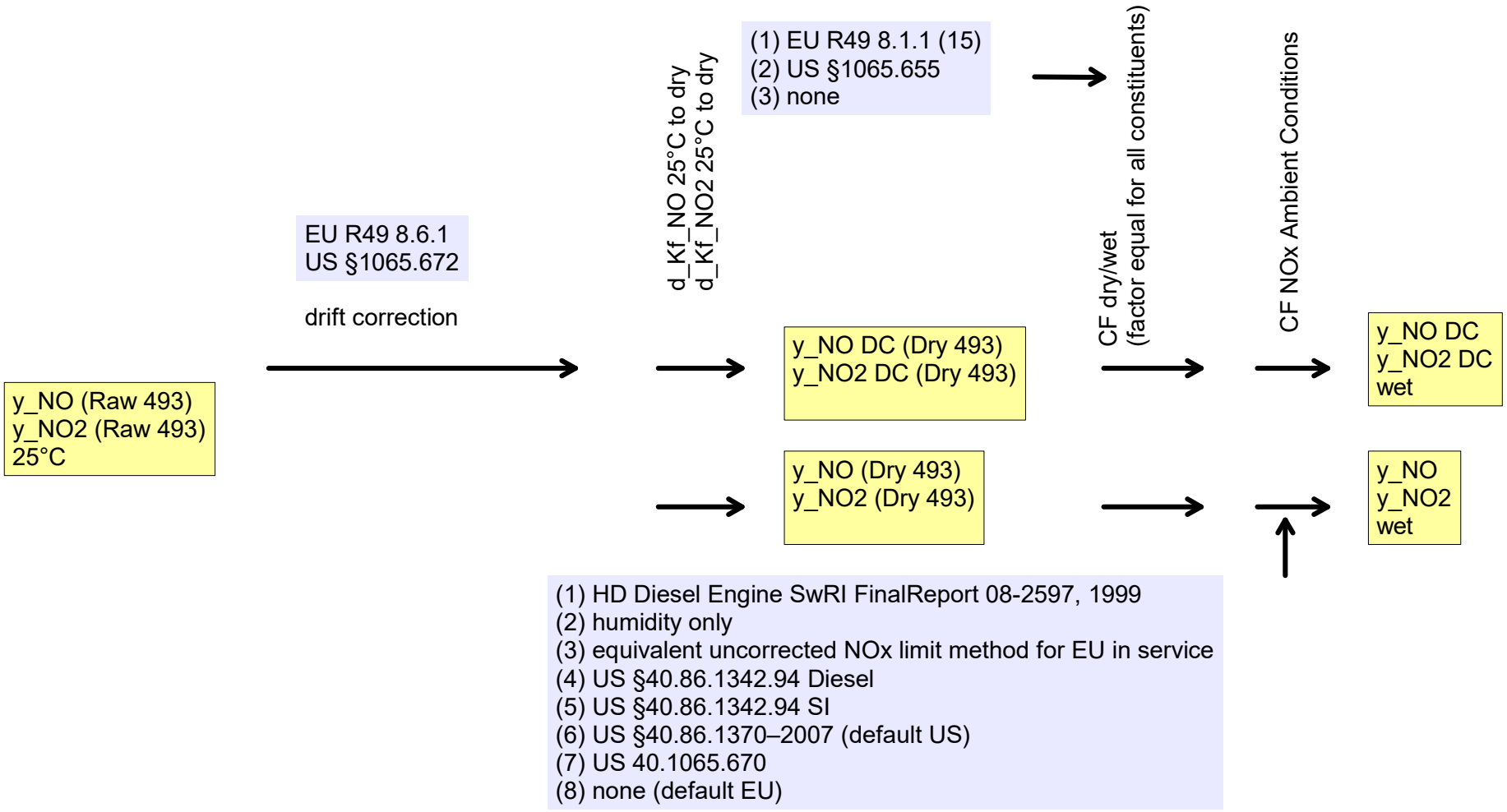



Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

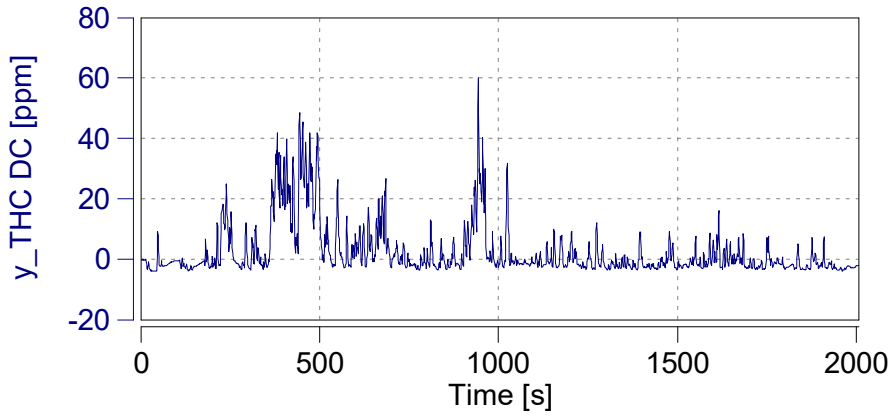
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

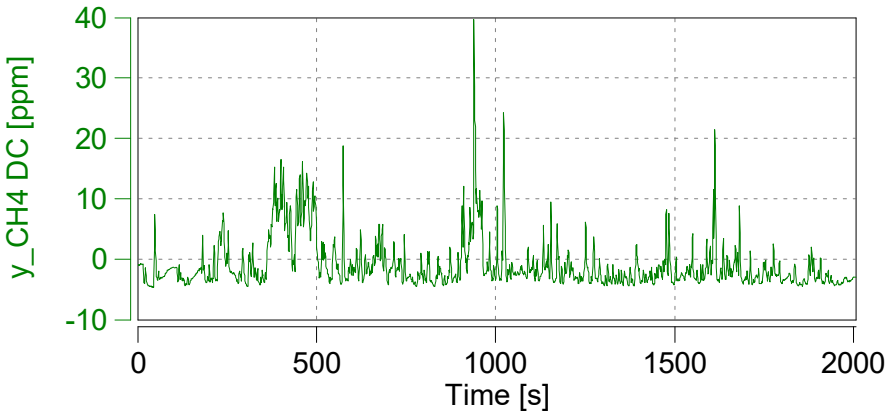
## NOx - AVL 493

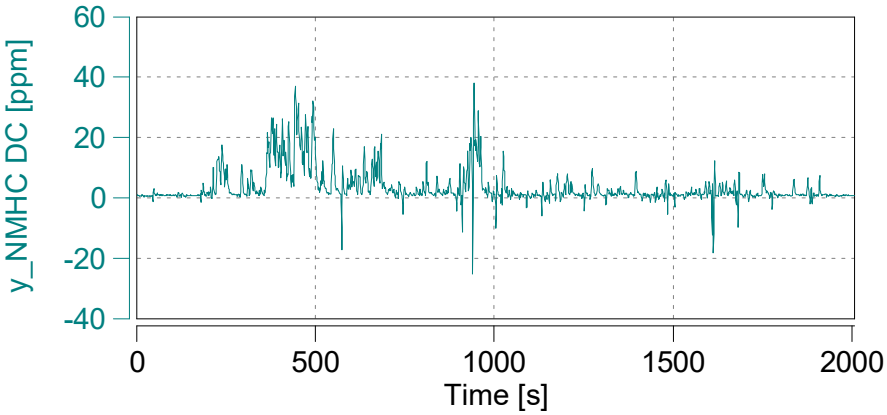

y_NO (Raw 493)
y_NO2 (Raw 493)
25°C
EU R49 8.6.1
US §1065.672
drift correction
d_Kf_NO 25°C to dry
d_Kf_NO2 25°C to dry
(1) EU R49 8.1.1 (15)
(2) US §1065.655
(3) none
y_NO DC (Dry 493)
y_NO2 DC (Dry 493)
y_NO (Dry 493)
y_NO2 (Dry 493)
CF dry/wet
(factor equal for all constituents)
CF NOx Ambient Conditions
y_NO DC
y_NO2 DC
wet
y_NO
y_NO2
wet
(1) HD Diesel Engine SwRI FinalReport 08-2597, 1999
(2) humidity only
(3) equivalent uncorrected NOx limit method for EU in service
(4) US §40.86.1342.94 Diesel
(5) US §40.86.1342.94 SI
(6) US §40.86.1370–2007 (default US)
(7) US 40.1065.670
(8) none (default EU)

'B2 HWY West'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019



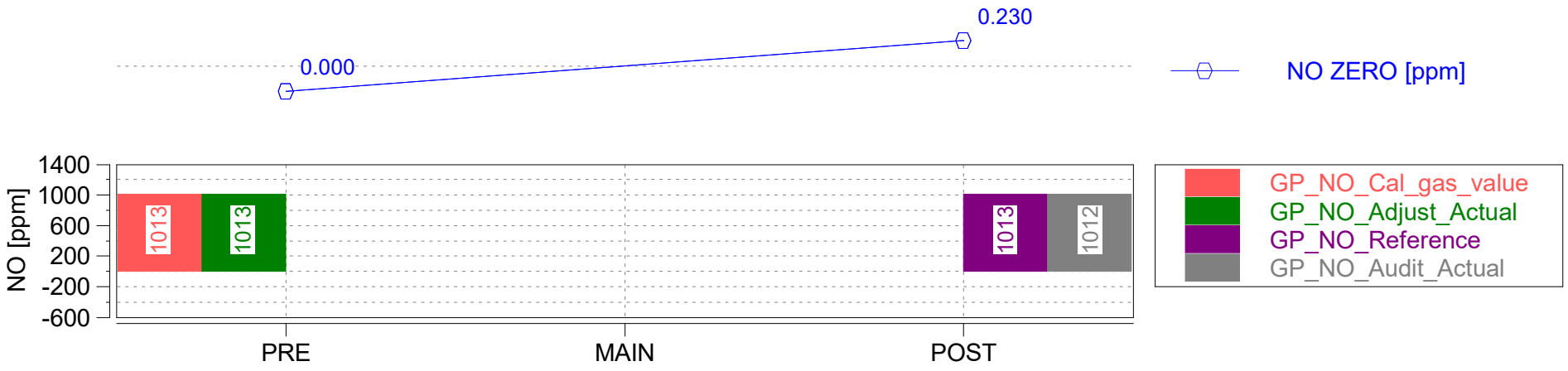

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

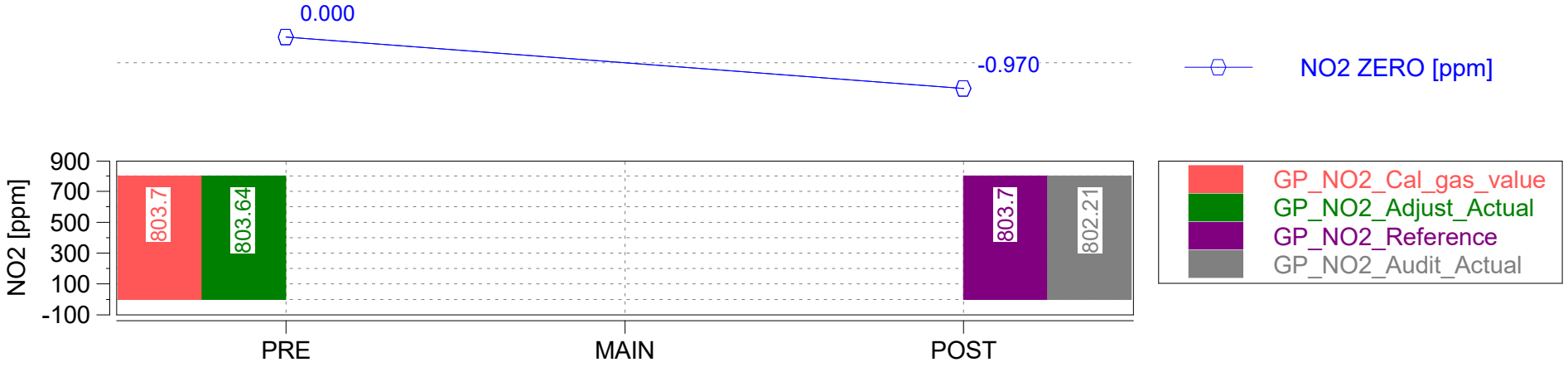
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: NO/NO2/NOx Zero - Span

'B2 HWY West'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019



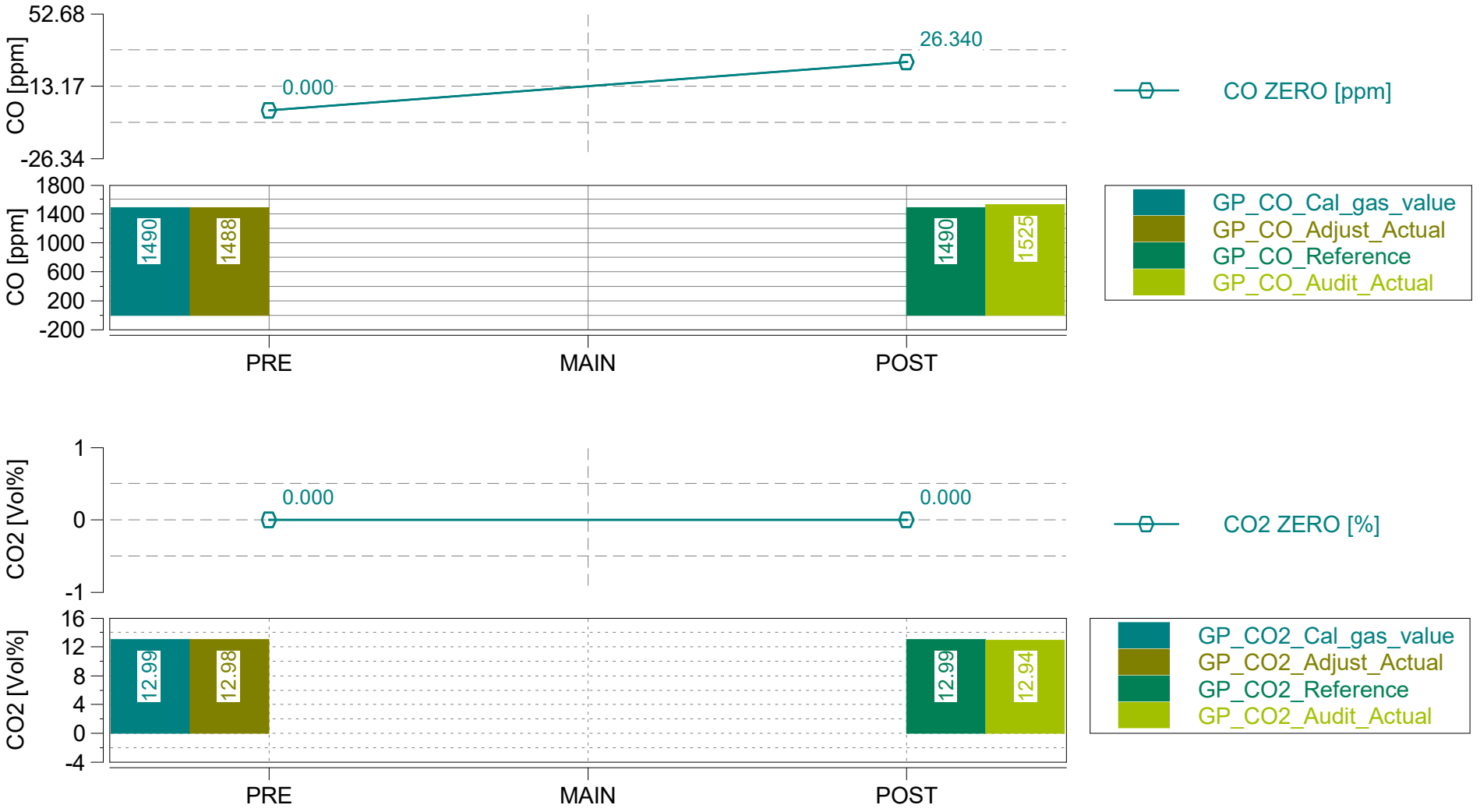

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: CO/CO2 Zero - Span

'B2 HWY West'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019



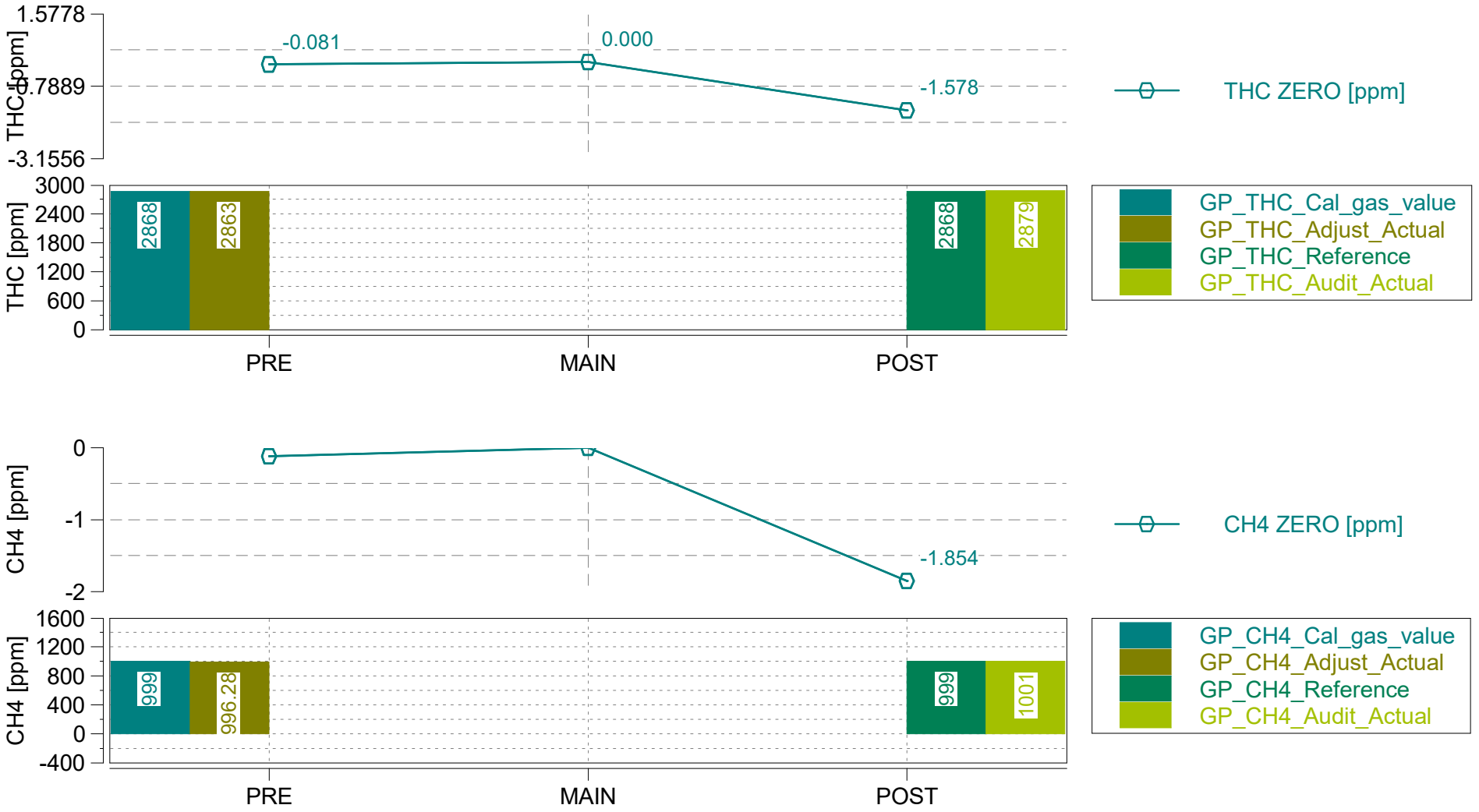

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: THC/CH4 Zero - Span

'B2 HWY West'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

| § | criterium | condition | value | unit | pass/fail |
|---|---|---|---|---|---|
| **GAS Leak Check** | The leakage rate on the vacuum side shall not exceed 0.5 per cent of the in-use flow rate for the portion of the system being checked. | The leakage rate <= 0.5% | **0.30** | **%** | pass |
| **PN Leak Check** | n/a | n/a | **n/a** | **n/a** | n/a |
| **PM Leak Check** | n/a | n/a | **n/a** | **n/a** | n/a |

GAS PEMS Devices

| | |
|---|---|
| Device ID | AVL492 |
| Serial Number | 0246 |
| Firmware Version | V1.10 |
| Main Test Date | 2021-02-18 |
| Leak Check Age [days] | 0 |

| | |
|---|---|
| Device ID | AVL4925 |
| Serial Number | 145 |
| Firmware Version | 1.17.0.3 |

EFM

| | |
|---|---|
| Device ID | AVL495 |
| Serial Number | 00826 |
| Serial Number Tube | 01080 |
| Firmware Version | V1.10 |

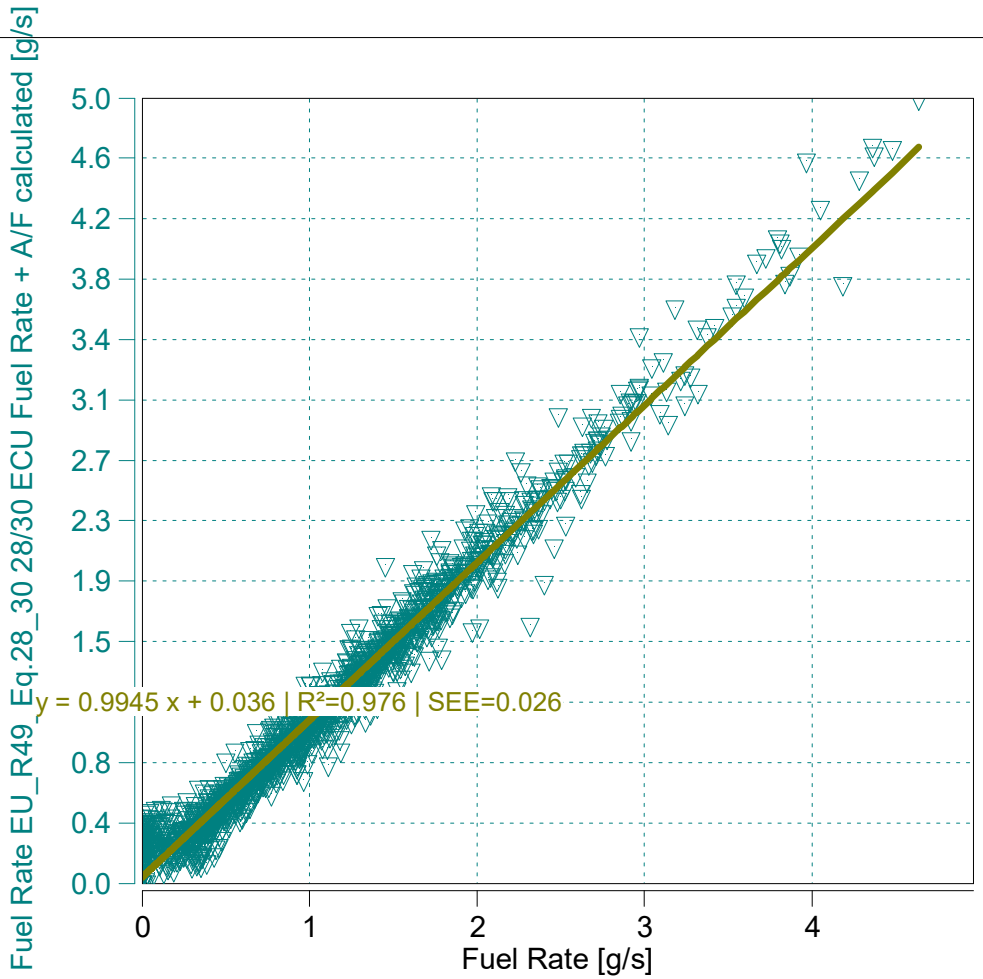
System Control

| | |
|---|---|
| SC Version | V2.6_212 |
| SC Serial Number | 60300923 |

Case: W177-4577
Page: Fuel Rate ECU vs. Calculated

'B2 HWY West'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019




EU 582/2011/Appendix I/3.2.1 | Fuel Rate ECU and calculated

y = 0.9945 x + 0.036 | R²=0.976 | SEE=0.026
m = 0.99 (0.9 - 1.1 recommended)
R² = 0.98 (min 0.9 mandatory)

Data from - to [% of Maximum]

0 100

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: Trip Summary

'A2 Mountain Uphill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019

| | | |
|---|---|---|
| Trip Duration | 2223.00 | s |
| Trip Duration (a) | 2223.00 | s |
| Trip Distance | 17.05 | mi |
| Trip Distance (a) | 17.05 | mi |
| | | |
| Trip Fuel Cons. (b) | 2.58 | kg |
| Trip Fuel Cons. (ab) | 2.58 | kg |
| Trip Fuel Cons. EU (ac) | 2.64 | kg |
| Trip Fuel Cons. US (ac) | 2.64 | kg |
| | | |
| Trip Fuel Economy (b) | 18.68 | mpg_US |
| Trip Fuel Economy (ab) | 18.68 | mpg_US |
| Trip Fuel Economy EU (ac) | 18.31 | mpg_US |
| Trip Fuel Economy US (ac) | 18.26 | mpg_US |
| Trip Fuel Economy GGE (b) | 18.68 | mpg_US |
| Trip Fuel Economy GGE (ab) | 18.68 | mpg_US |
| Trip Fuel Economy EU GGE (ac) | 18.31 | mpg_US |
| Trip Fuel Economy US GGE (ac) | 18.26 | mpg_US |
| | | |
| Trip Av. Eng. Speed | 1399.92 | rpm |
| Trip Av. Torque | 63.33 | lbft |
| Trip Av. Power | 24.06 | hp |
| Trip Work | | |
| Trip Work (a) | 14.86 | hphr |
| | | |
| Trip Exhaust Mass | 42.50 | kg |
| Trip Exhaust Mass EU (ac) | 41.08 | kg |
| Trip Exhaust Mass US (ac) | 41.04 | kg |
| | | |
| Trip Av. Amb. Temperature | 67.39 | deg_F |
| Trip Av. Humidity | 14.53 | % |
| Trip Av. GPS Altitude | 556.32 | m |
| | | |
| Fuel Type | Petrol (E10) | |

| | | |
|---|---|---|
| ave THC | 8.42434 | ppm |
| ave NMHC | 6.09720 | ppm |
| ave CH4 | 2.32714 | ppm |
| ave CO | 254.88639 | ppm |
| ave CO2 | 10.50728 | % |
| ave NOx | 10.37366 | ppm |
| ave PM | n/a | mg/m3 |
| ave Soot meas | n/a | mg/m3 |
| ave Soot | n/a | mg/m3 |
| ave PN | n/a | #/cm3 |
| | | |
| tot THC | 0.34633 | g |
| tot NMHC | 0.20625 | g |
| tot CH4 | 0.14798 | g |
| tot CO | 13.61607 | g |
| tot CO2 | 8002.65127 | g |
| tot NO (d) | 0.33626 | g |
| tot NO2 | 0.10170 | g |
| tot NOx | 0.43796 | g |
| tot Soot | n/a | g |
| tot Soot meas | n/a | g |
| tot PM | n/a | g |
| tot PN | n/a | # |
| | | |
| PM measurement type | 0.00000 | - |
| tot Soot on PM filter (estim.) | 0.00000 | mg |
| Soot --> PM simple scaling factor | 1.00000 | - |
| | | |
| Trip Av. Veh. Speed | 27.61767 | mi/hr |
| | | |
| Trip Distance Share Urban | 29.51085 | % distance |
| Trip Distance Share Rural | 70.48915 | % distance |
| Trip Distance Share Motorway | 0.00000 | % distance |

| | | |
|---|---|---|
| BS CO2 | 538.62388 | g/hphr |
| BS CO | 0.91644 | g/hphr |
| BS THC | 0.02331 | g/hphr |
| BS NMHC | 0.01388 | g/hphr |
| BS CH4 | 0.00996 | g/hphr |
| BS NO (d) | 0.02263 | g/hphr |
| BS NO2 | 0.00685 | g/hphr |
| BS NOx | 0.02948 | g/hphr |
| BS Soot | n/a | g/hphr |
| BS Soot meas | n/a | g/hphr |
| BS PM | n/a | g/hphr |
| BS PN | n/a | #/hpr |
| | | |
| DS CO2 | 469.25611 | g/mi |
| DS CO | 0.79841 | g/mi |
| DS THC | 0.02031 | g/mi |
| DS NMHC | 0.01209 | g/mi |
| DS CH4 | 0.00868 | g/mi |
| DS NO (d) | 0.01972 | g/mi |
| DS NO2 | 0.00596 | g/mi |
| DS NOx | 0.02568 | g/mi |
| DS Soot | n/a | g/mi |
| DS Soot meas | n/a | g/mi |
| DS PM | n/a | g/mi |
| DS PN | n/a | #/mi |
| | | |
| FS CO2 | 3098.49935 | g/kg |
| FS CO | 5.27193 | g/kg |
| FS THC | 0.13409 | g/kg |
| FS NMHC | 0.07986 | g/kg |
| FS CH4 | 0.05729 | g/kg |
| FS NO (d) | 0.13019 | g/kg |
| FS NO2 | 0.03938 | g/kg |
| FS NOx | 0.16957 | g/kg |
| FS Soot | n/a | g/kg |
| FS Soot meas | n/a | g/kg |
| FS PM | n/a | g/kg |
| FS PN | n/a | #/kg |

(a) GAS PEMS measurement state only, (b) based on fuel rate input (ECU, Fuel Meter), (c) Based on A/F ratio (eq 28-32 - R49)
(d) NO calculated using molecular weight of NO2, GGE=Gasoline Gallon Equivalents

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

# Case: W177-4577
# Page: Trip Summary Drift Corrected

'A2 Mountain Uphill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019

| | | |
|---|---|---|
| Trip Duration | 2223.00 | s |
| Trip Duration (a) | 2223.00 | s |
| Trip Distance | 17.05 | mi |
| Trip Distance (a) | 17.05 | mi |
| | | |
| Trip Fuel Cons. (b) | 2.58 | kg |
| Trip Fuel Cons. (ab) | 2.58 | kg |
| Trip Fuel Cons. EU (ac) | 2.64 | kg |
| Trip Fuel Cons. US (ac) | 2.64 | kg |
| | | |
| Trip Fuel Economy (b) | 18.68 | mpg_US |
| Trip Fuel Economy (ab) | 18.68 | mpg_US |
| Trip Fuel Economy EU (ac) | 18.31 | mpg_US |
| Trip Fuel Economy US (ac) | 18.26 | mpg_US |
| Trip Fuel Economy GGE (b) | 18.68 | mpg_US |
| Trip Fuel Economy GGE (ab) | 18.68 | mpg_US |
| Trip Fuel Economy EU GGE (ac) | 18.31 | mpg_US |
| Trip Fuel Economy US GGE (ac) | 18.26 | mpg_US |
| | | |
| Trip Av. Eng. Speed | 1399.92 | rpm |
| Trip Av. Torque | 63.33 | lbft |
| Trip Av. Power | 24.06 | hp |
| Trip Work | | |
| Trip Work (a) | 14.86 | hphr |
| | | |
| Trip Exhaust Mass | 42.50 | kg |
| Trip Exhaust Mass EU (ac) | 41.08 | kg |
| Trip Exhaust Mass US (ac) | 41.04 | kg |
| | | |
| Trip Av. Amb. Temperature | 67.39 | deg_F |
| Trip Av. Humidity | 14.53 | % |
| Trip Av. GPS Altitude | 556.32 | m |
| | | |
| Fuel Type | Petrol (E10) | |

| | | |
|---|---|---|
| ave THC DC | 8.45506 | ppm |
| ave NMHC DC | 6.06849 | ppm |
| ave CH4 DC | 2.38658 | ppm |
| ave CO DC | 252.03618 | ppm |
| ave CO2 DC | 10.53160 | % |
| ave NOx DC | 10.37671 | ppm |
| ave PM | n/a | mg/m3 |
| ave Soot meas | n/a | mg/m3 |
| ave Soot | n/a | mg/m3 |
| ave PN DC | | |
| | | |
| tot THC DC | 0.34670 | g |
| tot NMHC DC | 0.20551 | g |
| tot CH4 DC | 0.14907 | g |
| tot CO DC | 13.46381 | g |
| tot CO2 DC | 8021.17593 | g |
| tot NO DC (d) | 0.33631 | g |
| tot NO2 DC | 0.10180 | g |
| tot NOx DC | 0.43811 | g |
| tot Soot | n/a | g |
| tot Soot meas | n/a | g |
| tot PM | n/a | g |
| tot PN DC | | |
| | | |
| PM measurement type | 0.00000 | - |
| tot Soot on PM filter (estim.) | 0.00000 | mg |
| Soot --> PM simple scaling factor | 1.00000 | - |
| | | |
| Trip Av. Veh. Speed | 27.61767 | mi/hr |
| | | |
| Trip Distance Share Urban | 29.51085 | % distance |
| Trip Distance Share Rural | 70.48915 | % distance |
| Trip Distance Share Motorway | 0.00000 | % distance |

| | | |
|---|---|---|
| BS CO2 DC | 539.87069 | g/hphr |
| BS CO DC | 0.90619 | g/hphr |
| BS THC DC | 0.02333 | g/hphr |
| BS NMHC DC | 0.01383 | g/hphr |
| BS CH4 DC | 0.01003 | g/hphr |
| BS NO DC (d) | 0.02264 | g/hphr |
| BS NO2 DC | 0.00685 | g/hphr |
| BS NOx DC | 0.02949 | g/hphr |
| BS Soot | n/a | g/hphr |
| BS Soot meas | n/a | g/hphr |
| BS PM | n/a | g/hphr |
| BS PN DC | | |
| | | |
| DS CO2 DC | 470.34235 | g/mi |
| DS CO DC | 0.78949 | g/mi |
| DS THC DC | 0.02033 | g/mi |
| DS NMHC DC | 0.01205 | g/mi |
| DS CH4 DC | 0.00874 | g/mi |
| DS NO DC (d) | 0.01972 | g/mi |
| DS NO2 DC | 0.00597 | g/mi |
| DS NOx DC | 0.02569 | g/mi |
| DS Soot | n/a | g/mi |
| DS Soot meas | n/a | g/mi |
| DS PM | n/a | g/mi |
| DS PN DC | | |
| | | |
| FS CO2 DC | 3105.67180 | g/kg |
| FS CO DC | 5.21297 | g/kg |
| FS THC DC | 0.13424 | g/kg |
| FS NMHC DC | 0.07957 | g/kg |
| FS CH4 DC | 0.05772 | g/kg |
| FS NO DC (d) | 0.13022 | g/kg |
| FS NO2 DC | 0.03941 | g/kg |
| FS NOx DC | 0.16963 | g/kg |
| FS Soot | n/a | g/kg |
| FS Soot meas | n/a | g/kg |
| FS PM | n/a | g/kg |
| FS PN DC | | |

(a) GAS PEMS measurement state only, (b) based on fuel rate input (ECU, Fuel Meter), (c) Based on A/F ratio (eq 28-32 - R49)
(d) NO calculated using molecular weight of NO2, GGE=Gasoline Gallon Equivalents

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

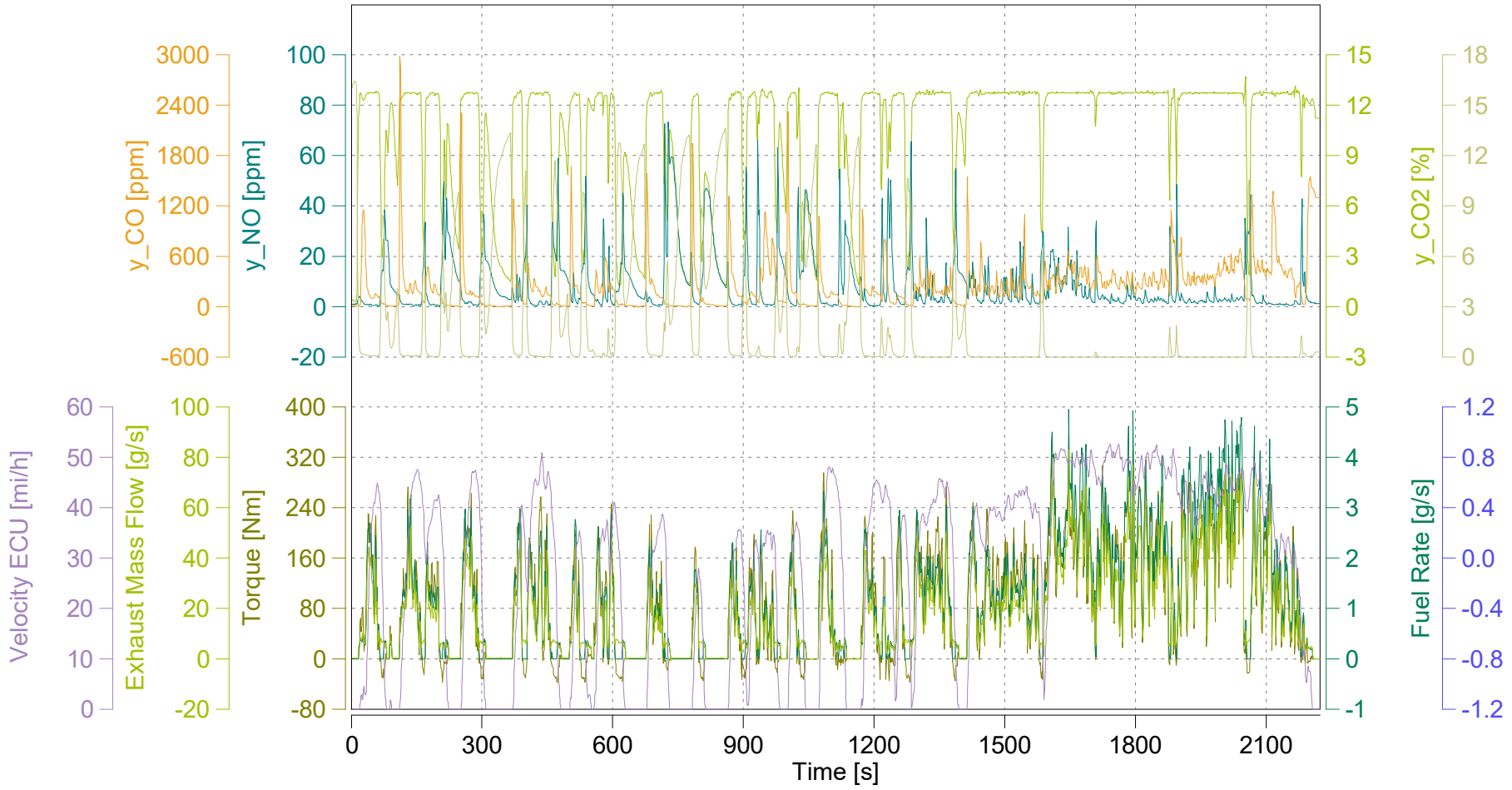
Case: W177-4577
Page: Time Alignment Check

'A2 Mountain Uphill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto

Absolute Time

y_THC
y_NO
y_CO2
y_O2
c_Soot
Fuel Rate
Exhaust Mass
Torque
Velocity ECU




AVL 492 Defa

THC
NO/NO2
CO/CO2
O2

Apply Defa

Alignment Plo

Reset Time

Reset Al

Apply Curr

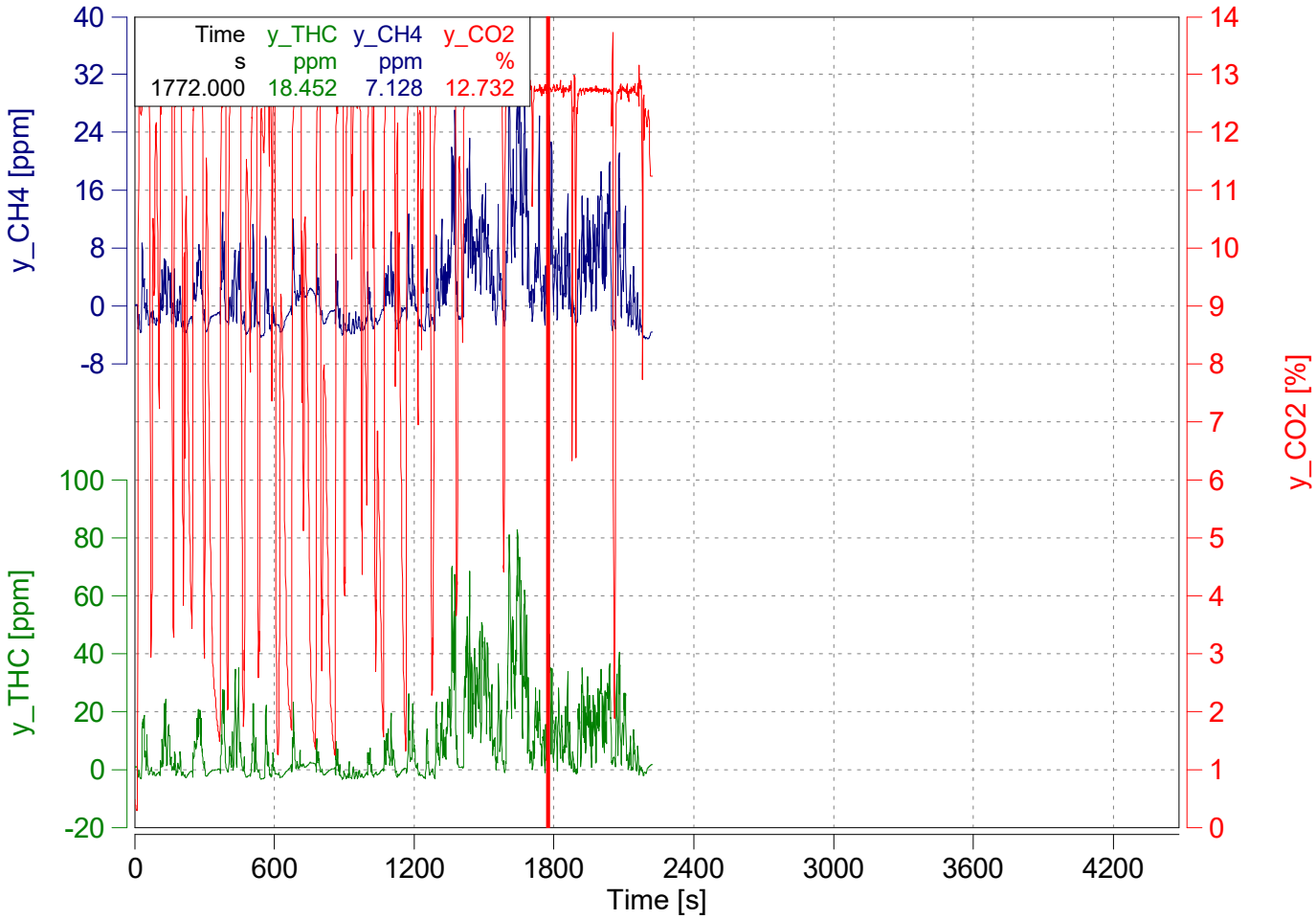
Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: Time Alignment of Gas Concentrations

'A2 Mountain Uphill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019




Absolute Time Shifts

| | | |
|---|---|---|
| y_THC | s | -5.2 |
| y_CH4 | s | -7.2 |

Reset Time Shifts in Plot

Apply Current Values

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

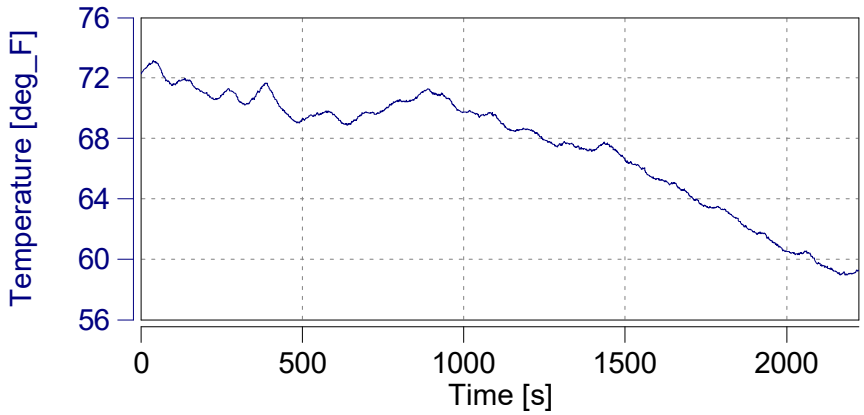
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

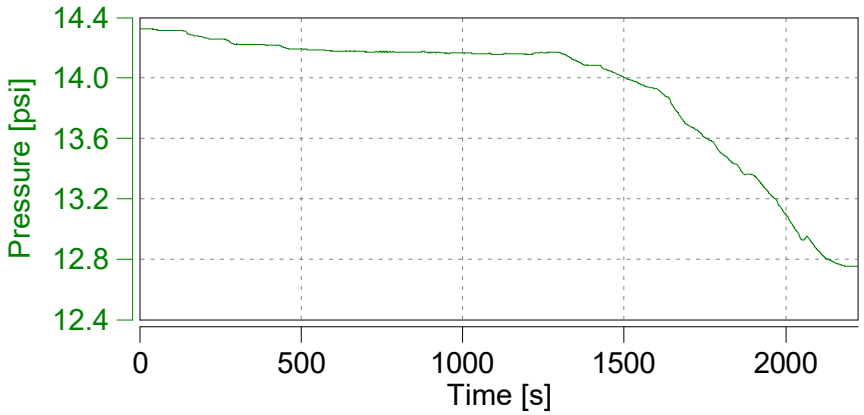
Case: W177-4577
Page: Ambient Conditions

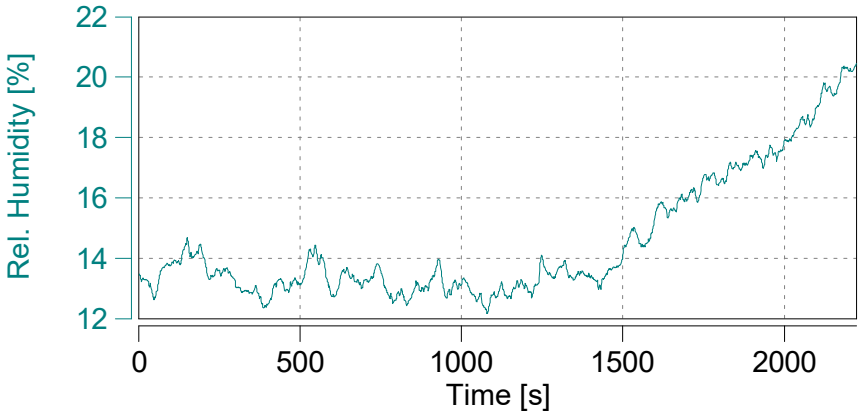
'A2 Mountain Uphill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

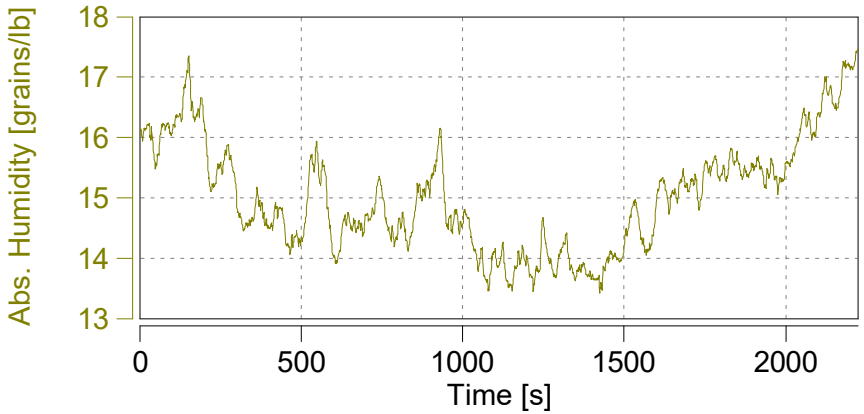
AVL

Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

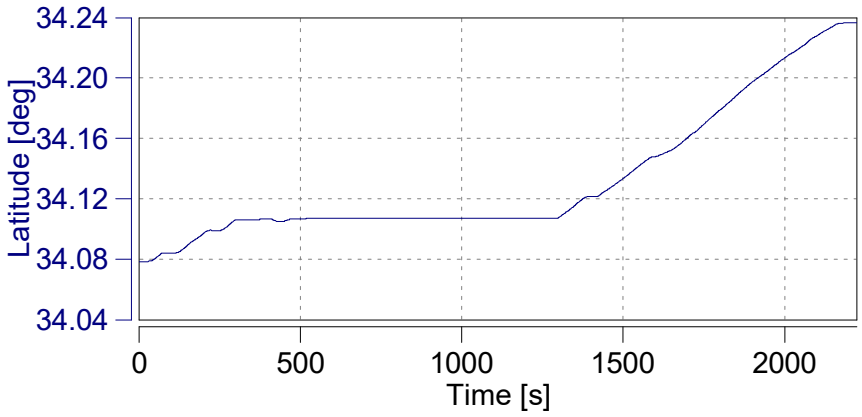
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

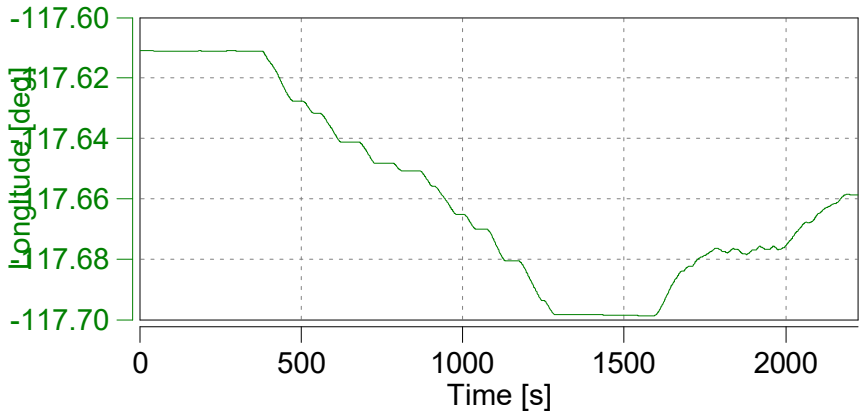
Case: W177-4577
Page: GPS

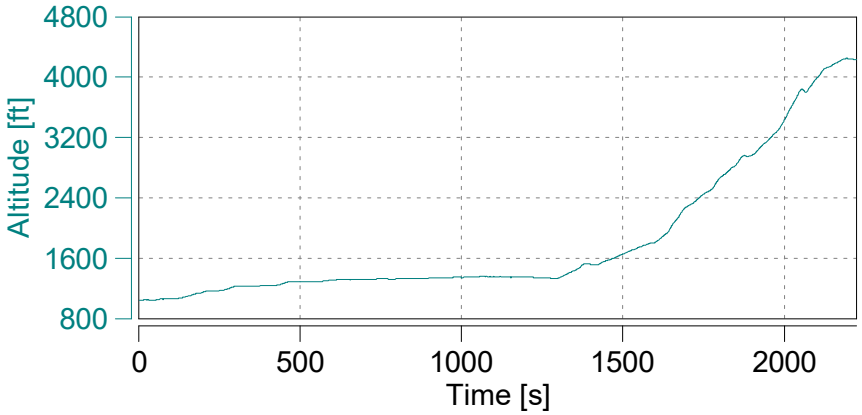
'A2 Mountain Uphill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

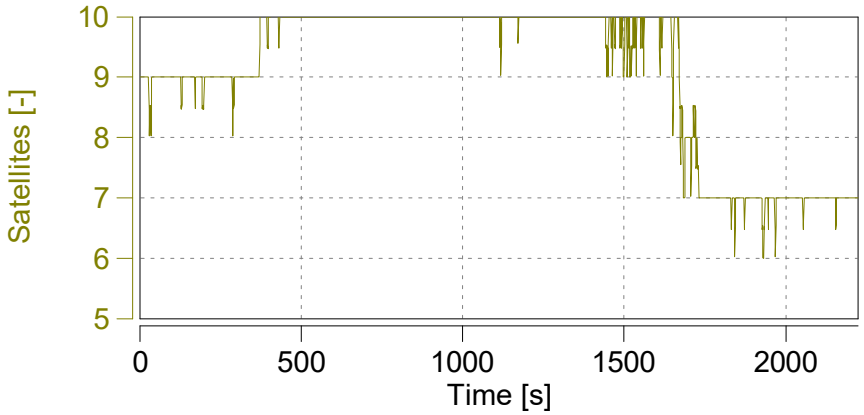
AVL

Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

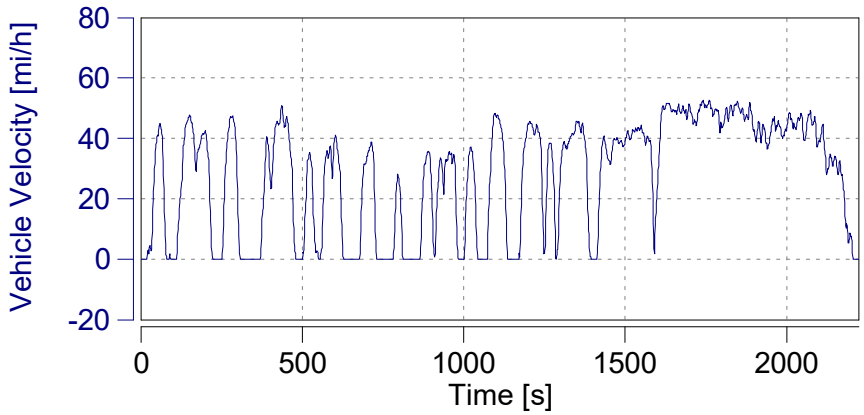
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

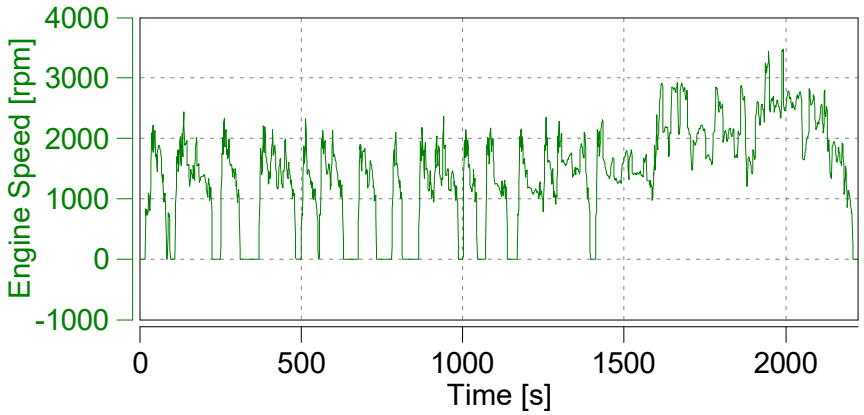
Case: W177-4577
Page: Engine (1)

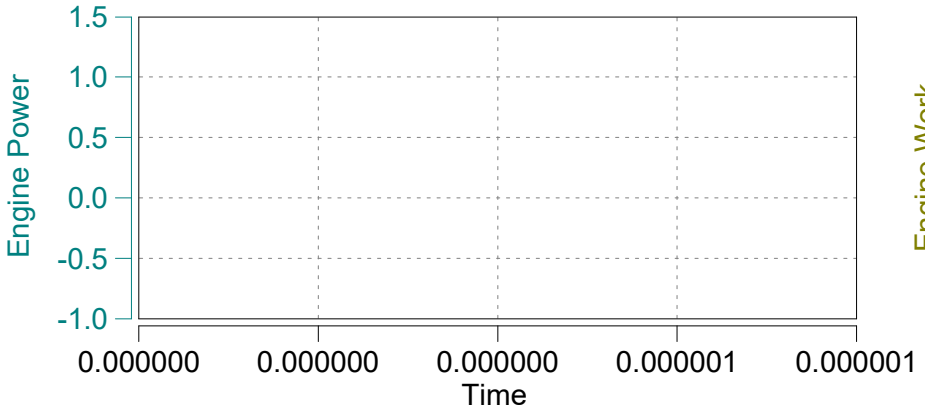
'A2 Mountain Uphill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

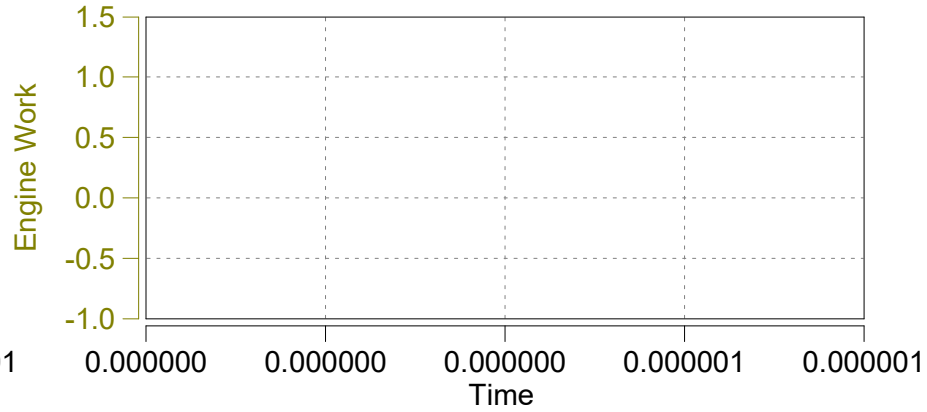
AVL

Concerto M.O.V.E, 2019



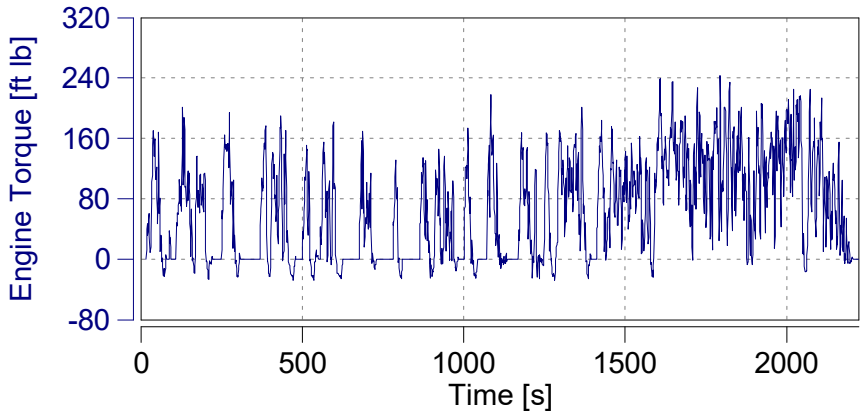

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

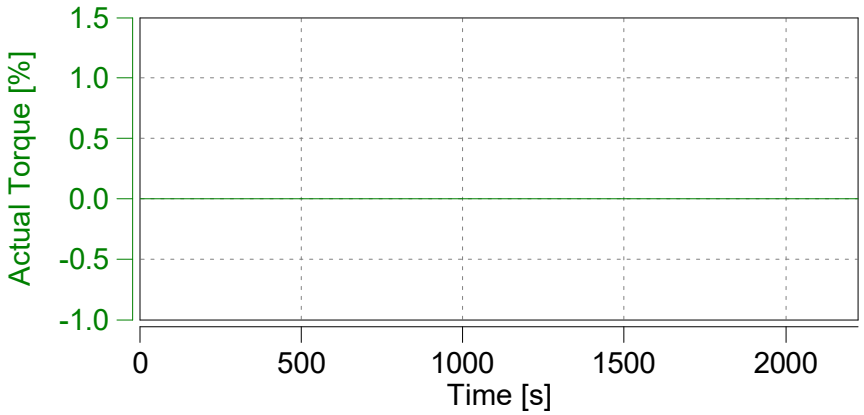
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

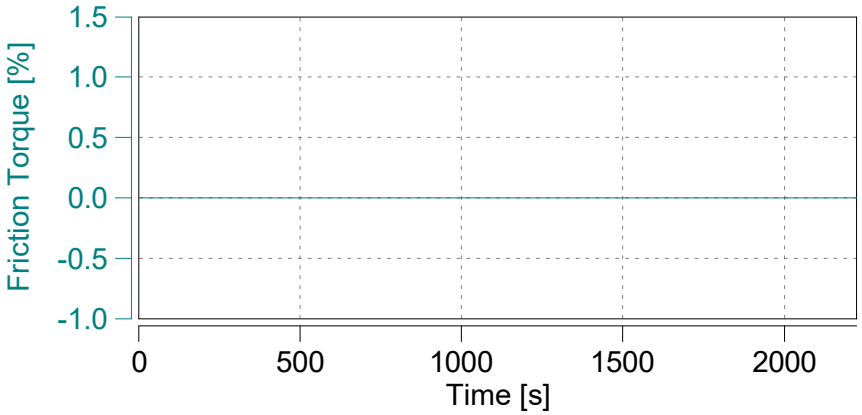
'A2 Mountain Uphill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

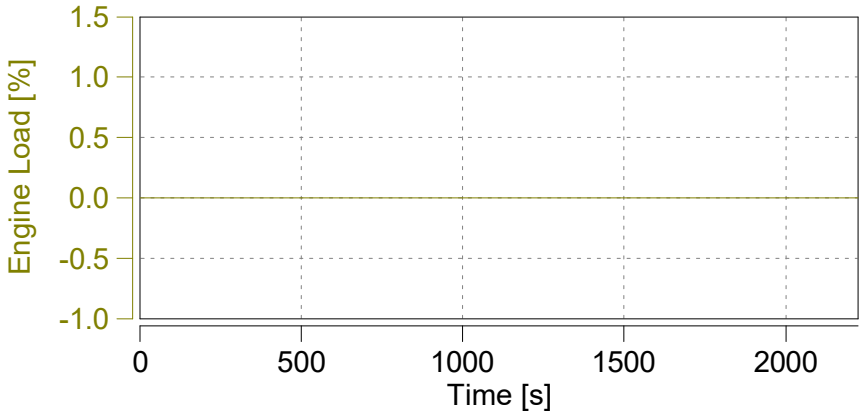
AVL

Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

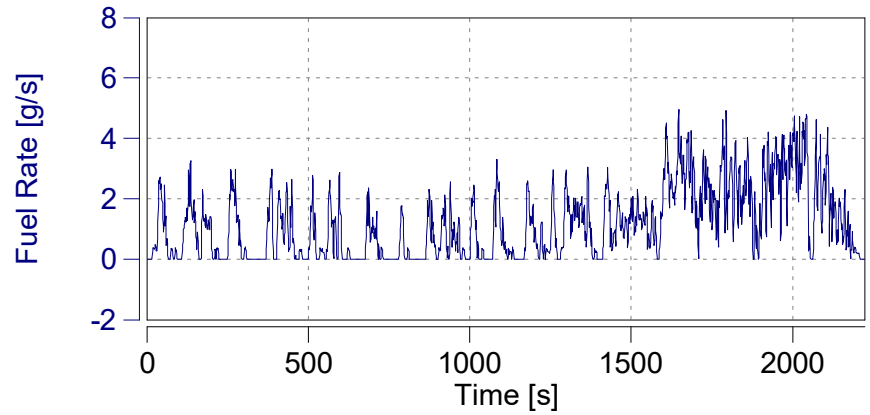
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

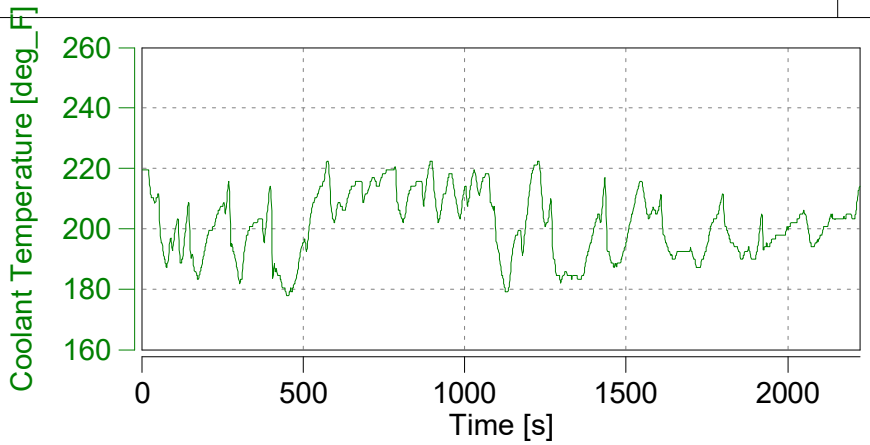
Case: W177-4577
Page: Engine (3)

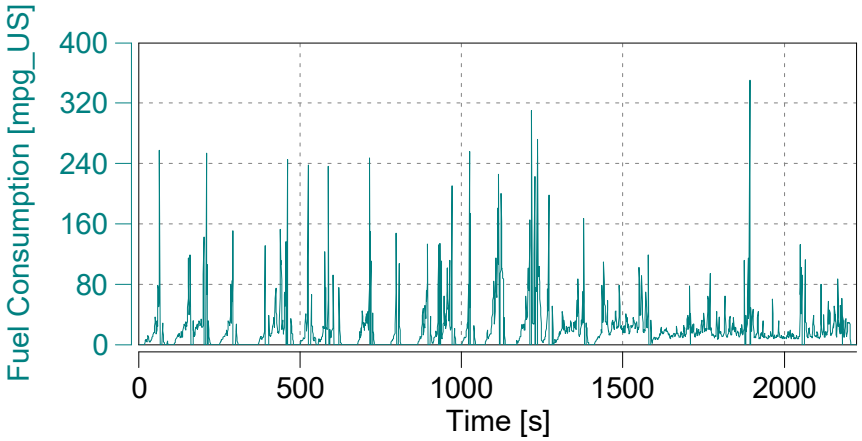
'A2 Mountain Uphill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

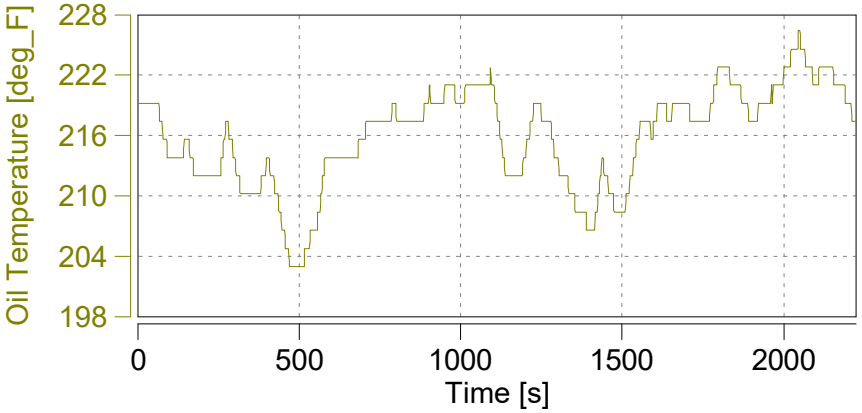
AVL

Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

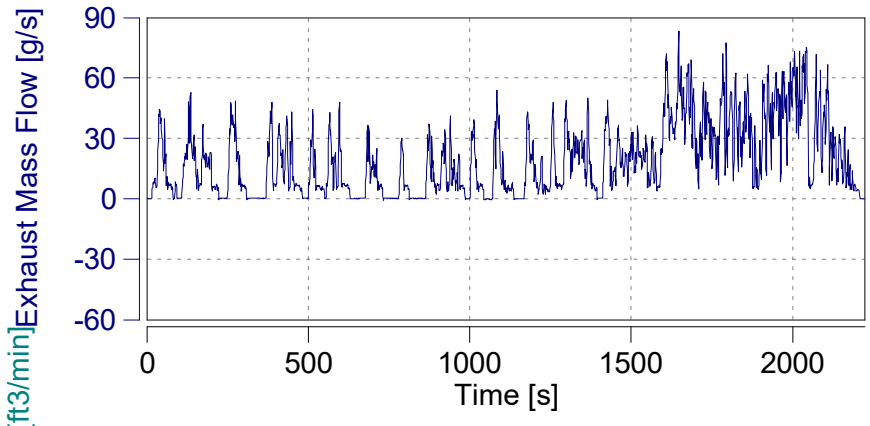
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

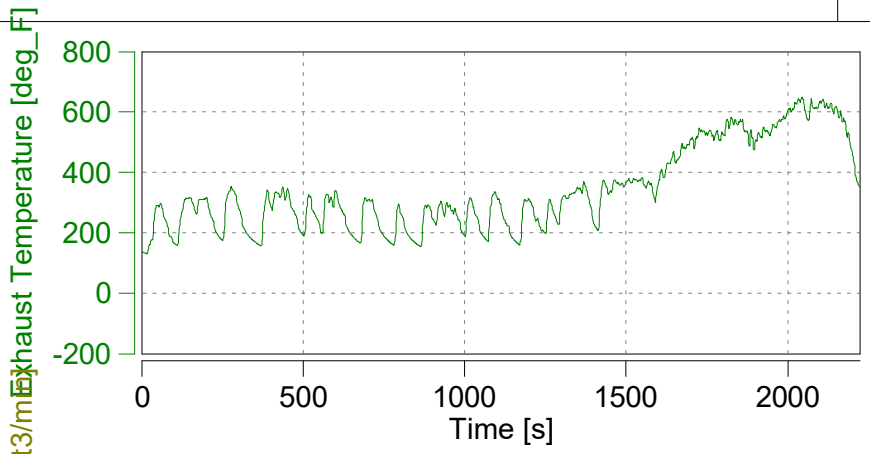
Case: W177-4577
Page: Exhaust Flow (1)

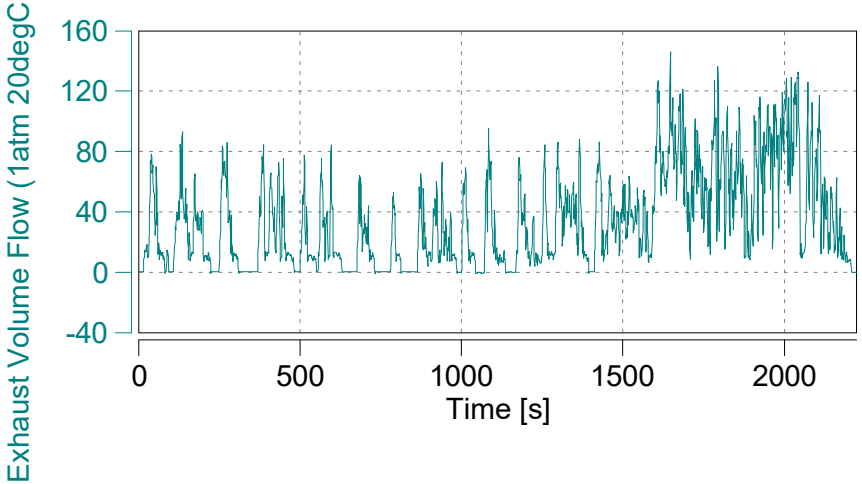
'A2 Mountain Uphill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

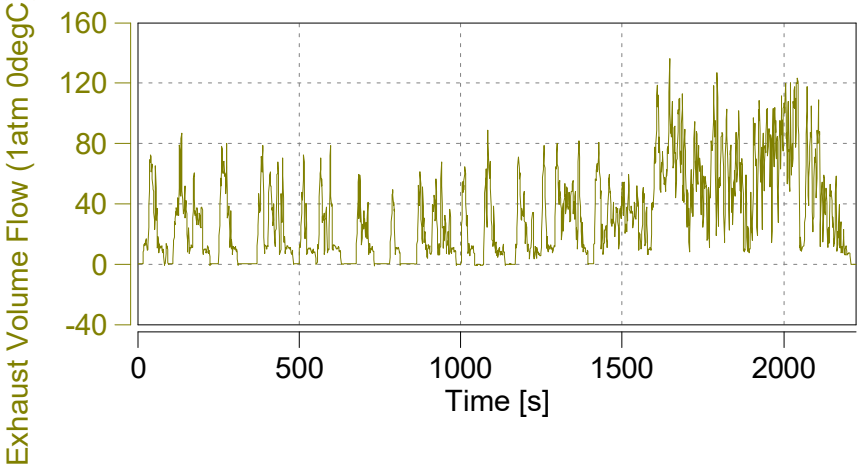
AVL

Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

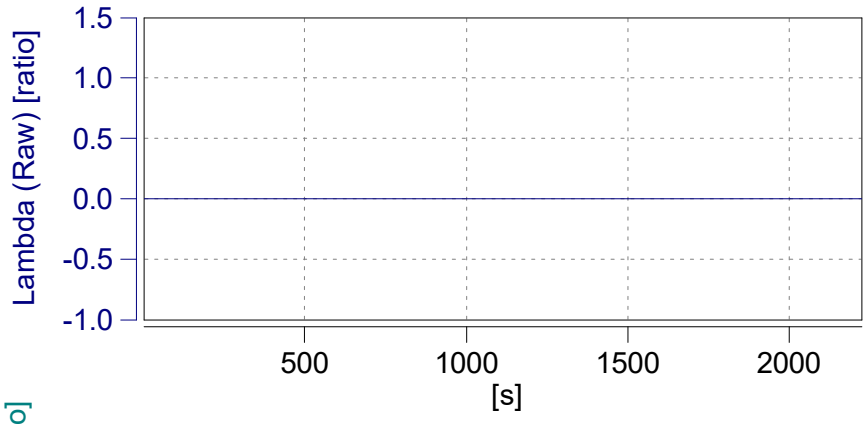
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

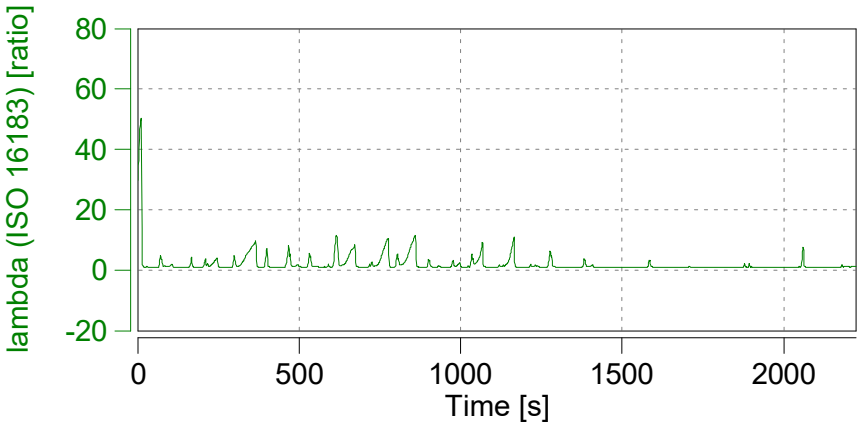
Case: W177-4577
Page: Exhaust Flow (2)

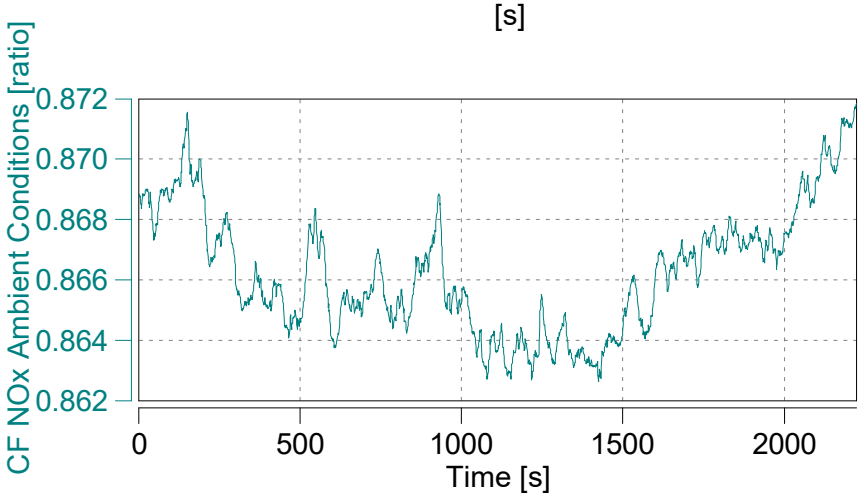
'A2 Mountain Uphill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

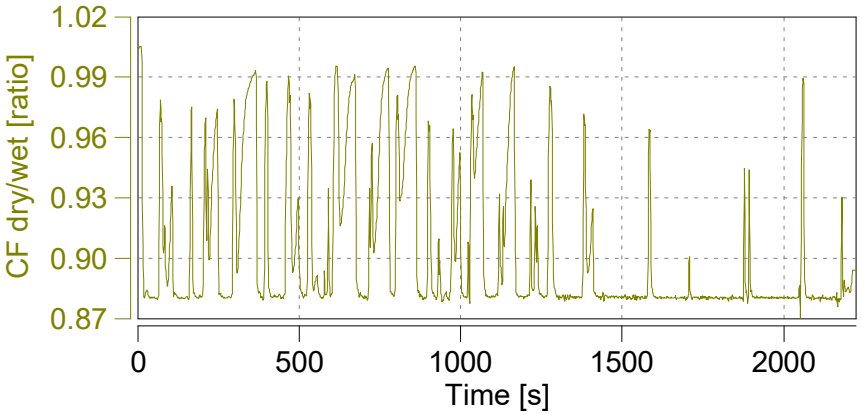
AVL

Concerto M.O.V.E, 2019



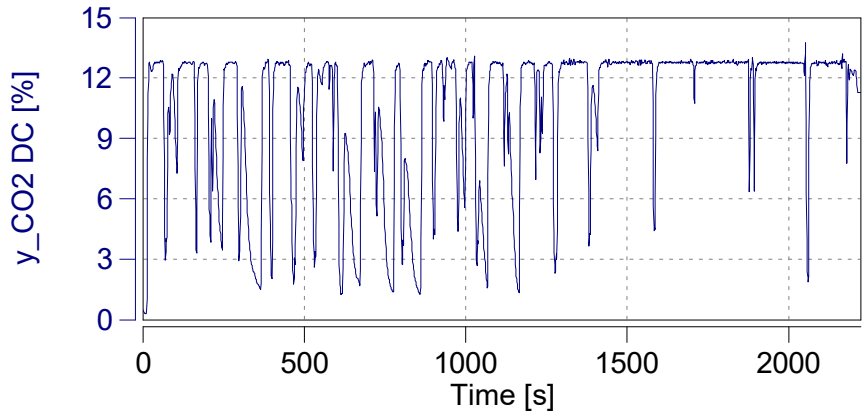

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

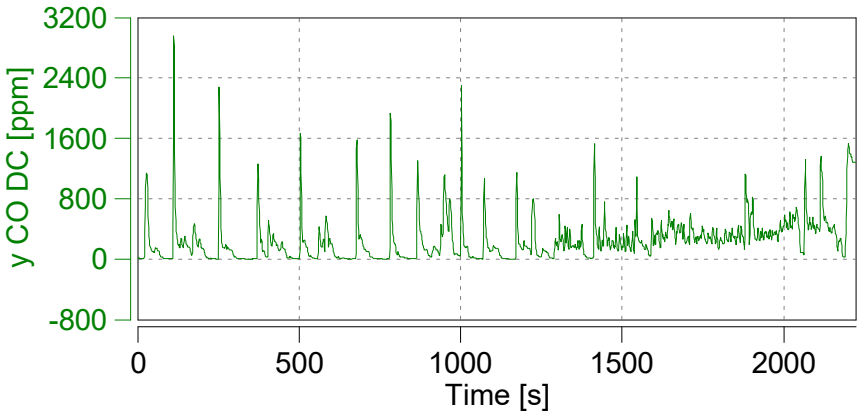
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

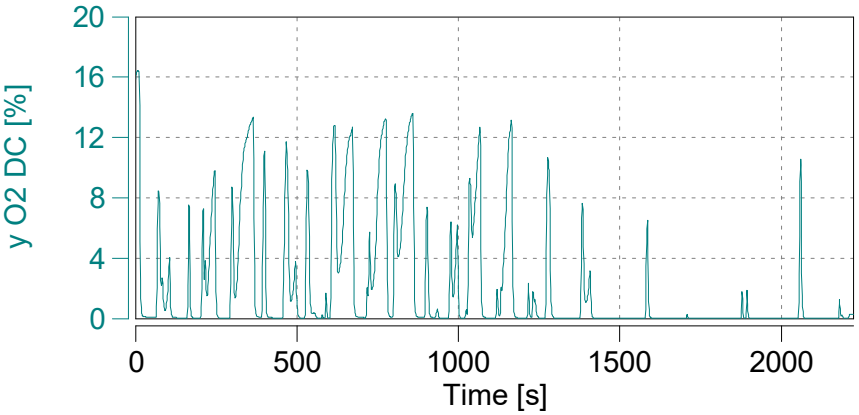
Case: W177-4577
Page: Corrected Emissions (1)

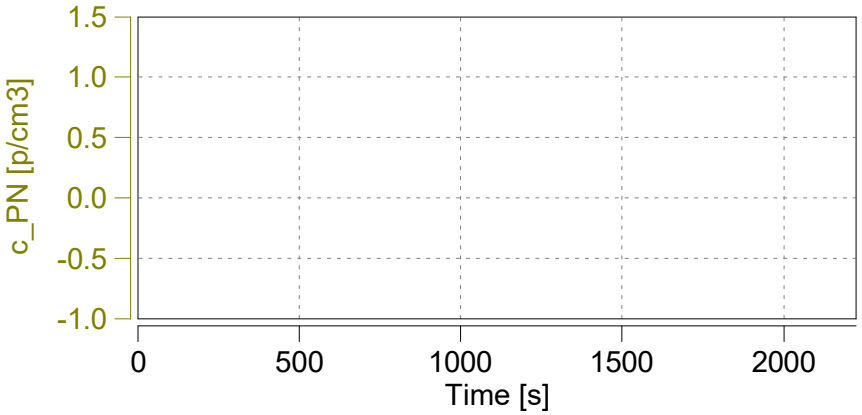
'A2 Mountain Uphill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

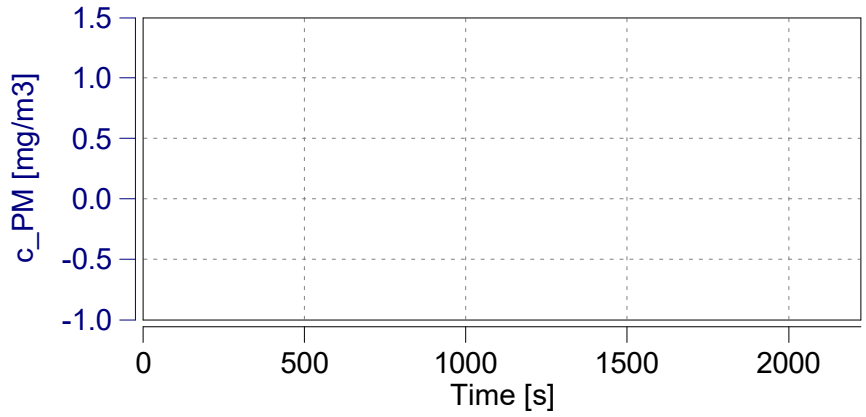
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

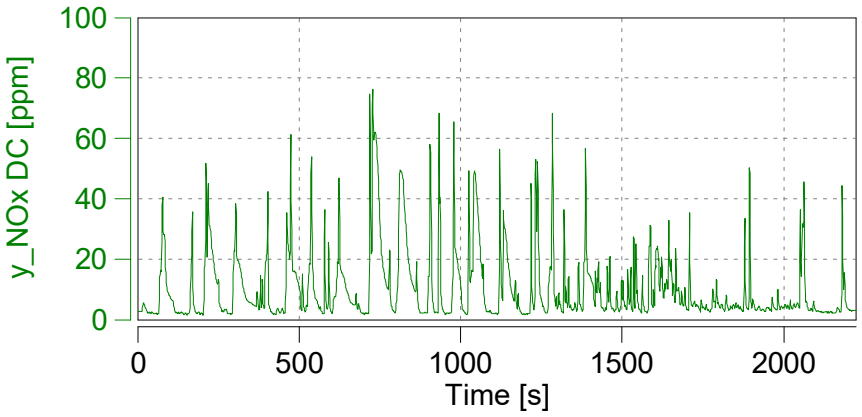
Case: W177-4577
Page: Corrected Emissions (2)

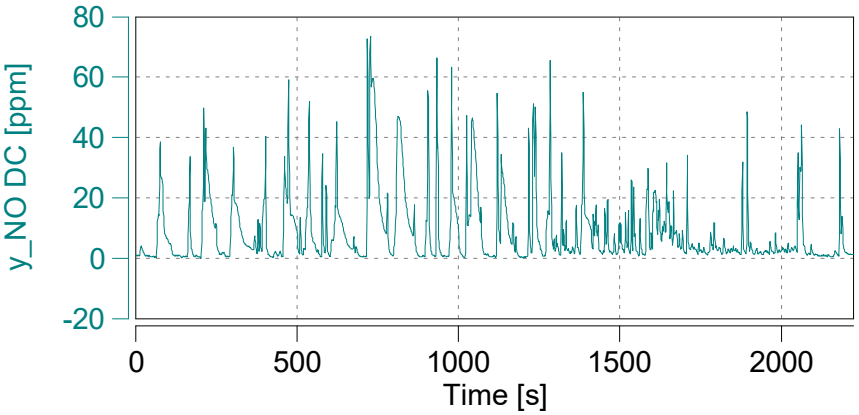
'A2 Mountain Uphill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

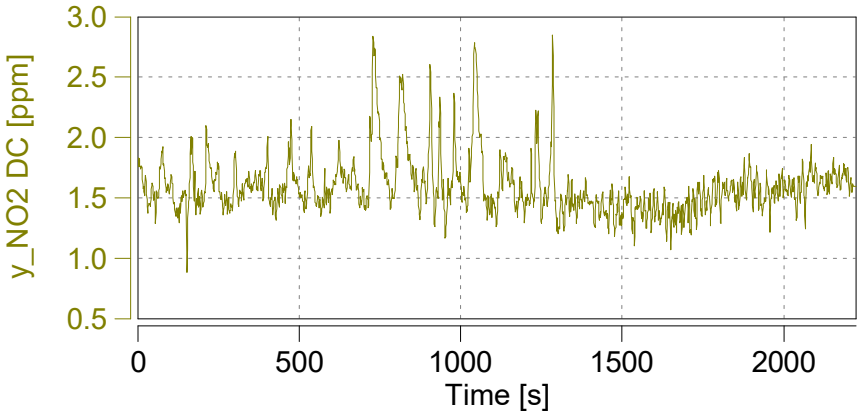
AVL

Concerto M.O.V.E, 2019



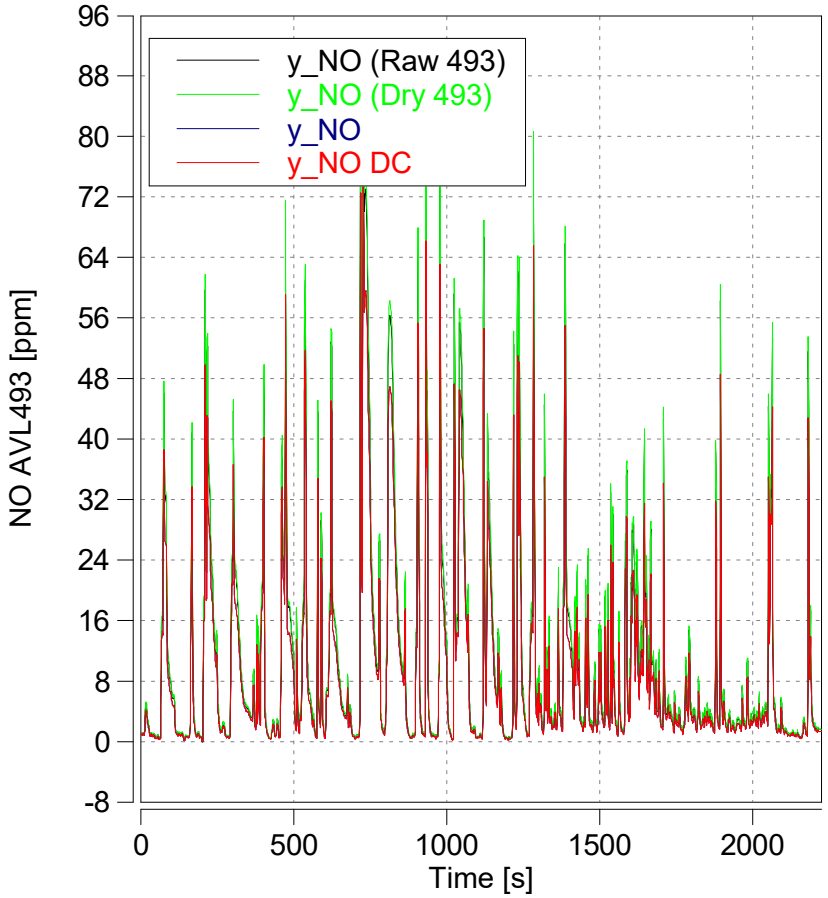

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

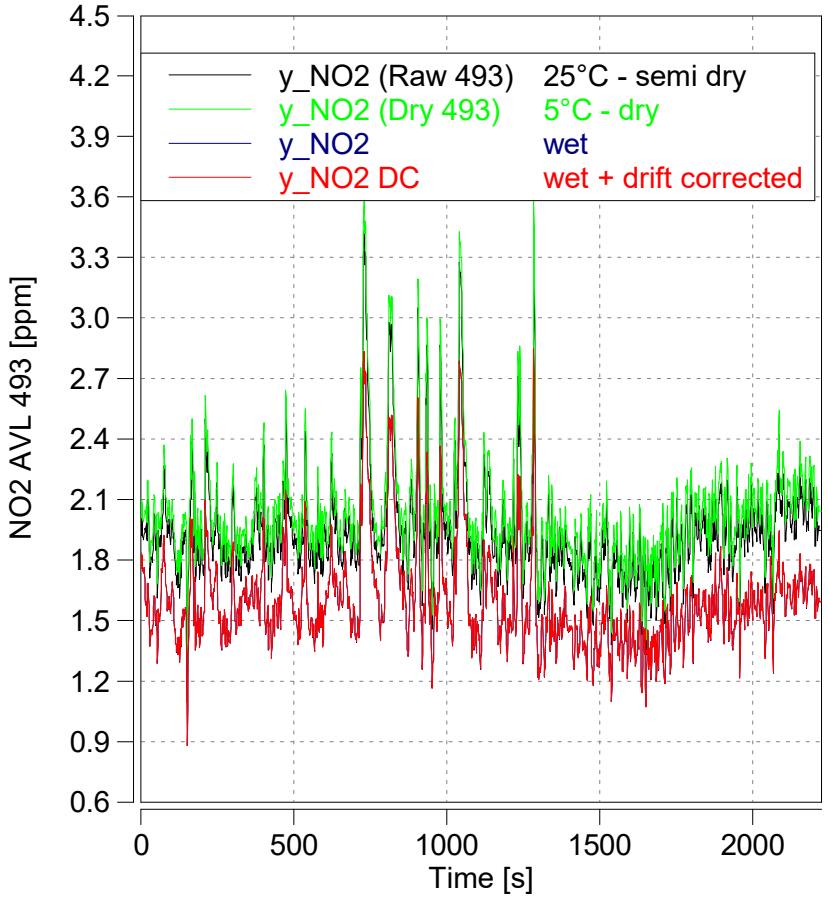
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: Corrected Emissions (3)

'A2 Mountain Uphill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019

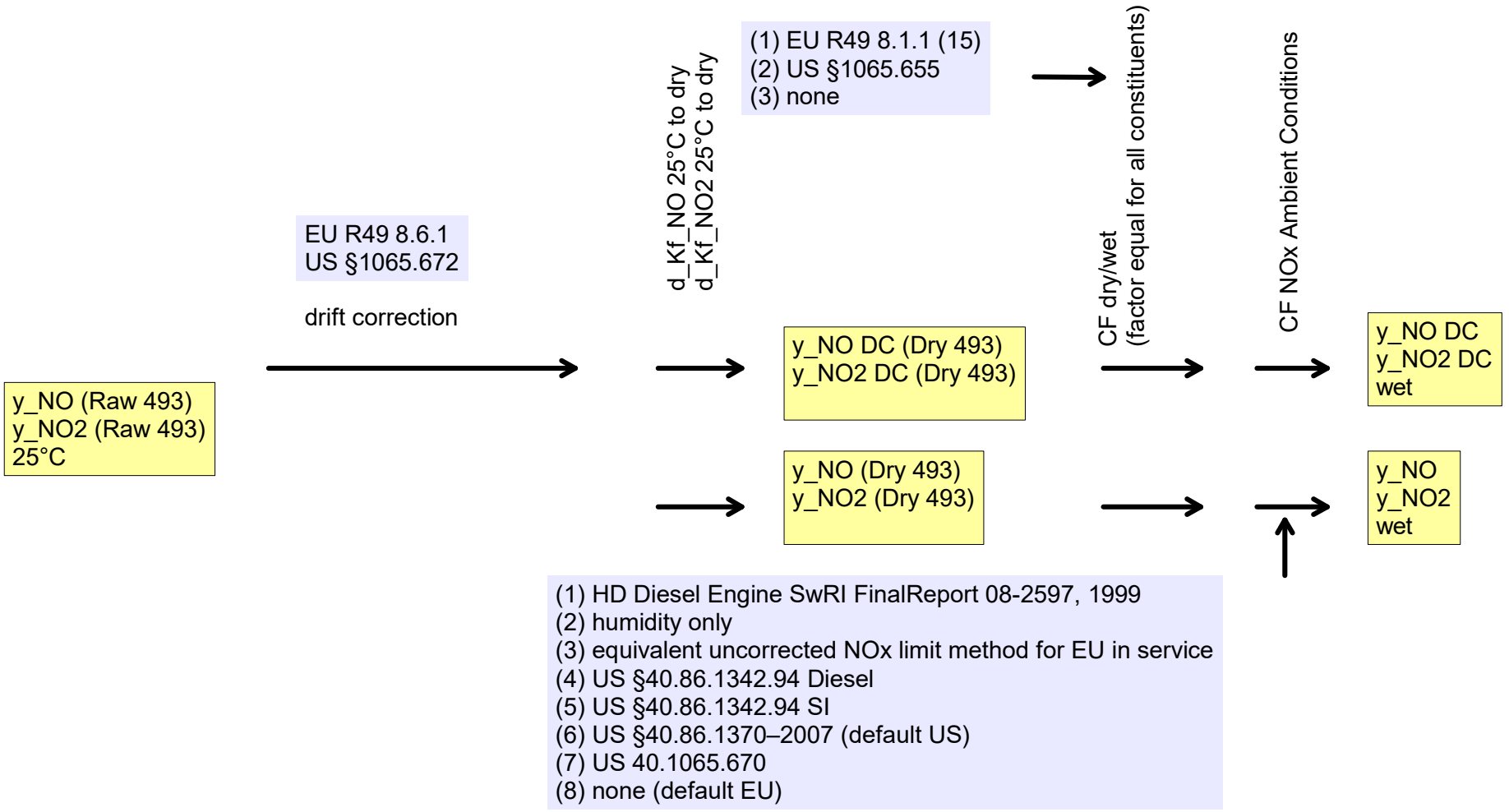



Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

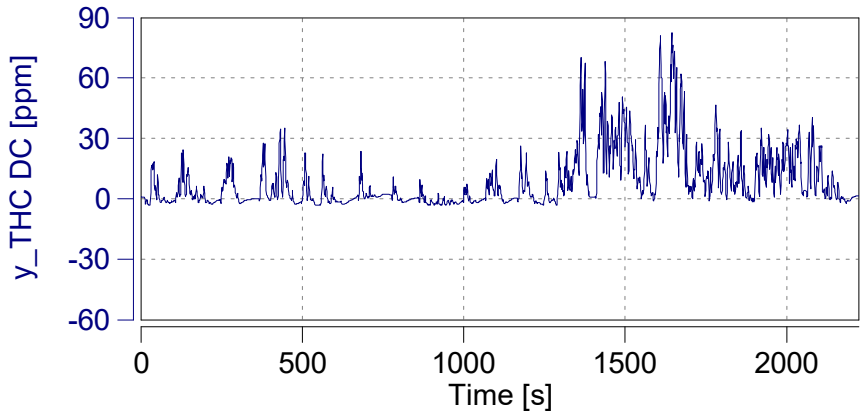
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

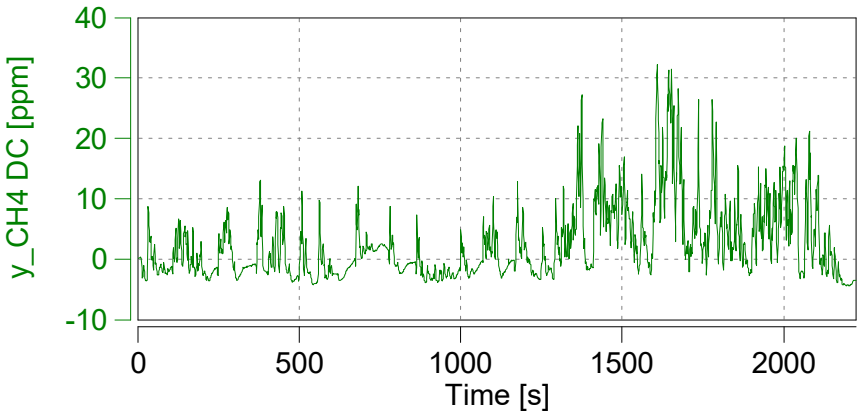
## NOx - AVL 493

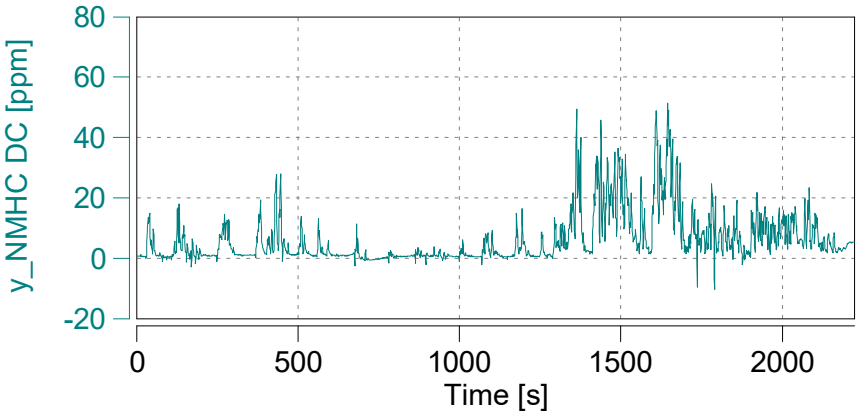

y_NO (Raw 493)
y_NO2 (Raw 493)
25°C
EU R49 8.6.1
US §1065.672
drift correction
d_Kf_NO 25°C to dry
d_Kf_NO2 25°C to dry
(1) EU R49 8.1.1 (15)
(2) US §1065.655
(3) none
y_NO DC (Dry 493)
y_NO2 DC (Dry 493)
y_NO (Dry 493)
y_NO2 (Dry 493)
CF dry/wet
(factor equal for all constituents)
CF NOx Ambient Conditions
y_NO DC
y_NO2 DC
wet
y_NO
y_NO2
wet
(1) HD Diesel Engine SwRI FinalReport 08-2597, 1999
(2) humidity only
(3) equivalent uncorrected NOx limit method for EU in service
(4) US §40.86.1342.94 Diesel
(5) US §40.86.1342.94 SI
(6) US §40.86.1370–2007 (default US)
(7) US 40.1065.670
(8) none (default EU)

'A2 Mountain Uphill'
Start Date: 02/18/2021
Start Time: 10:14:32.0





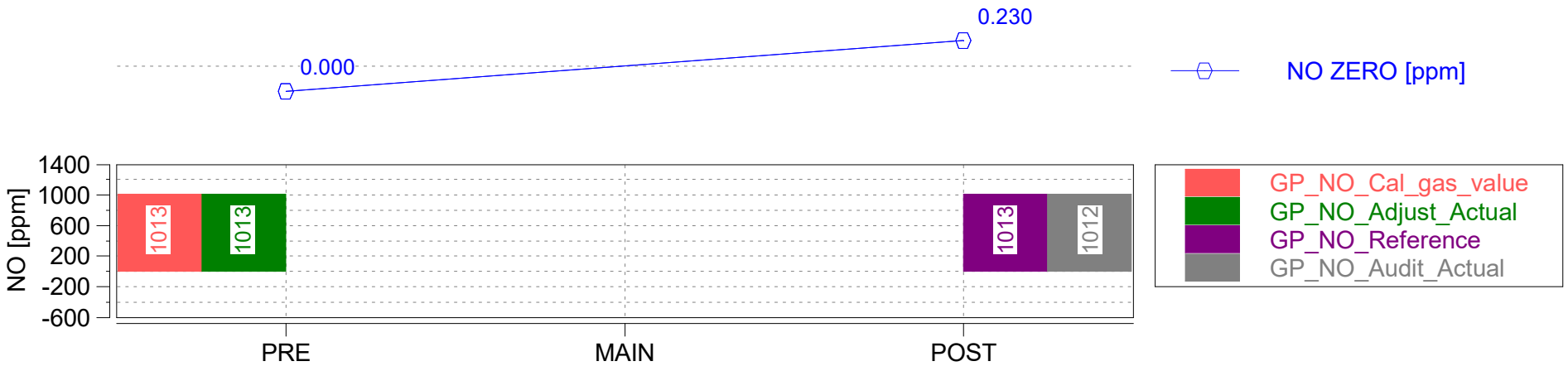

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

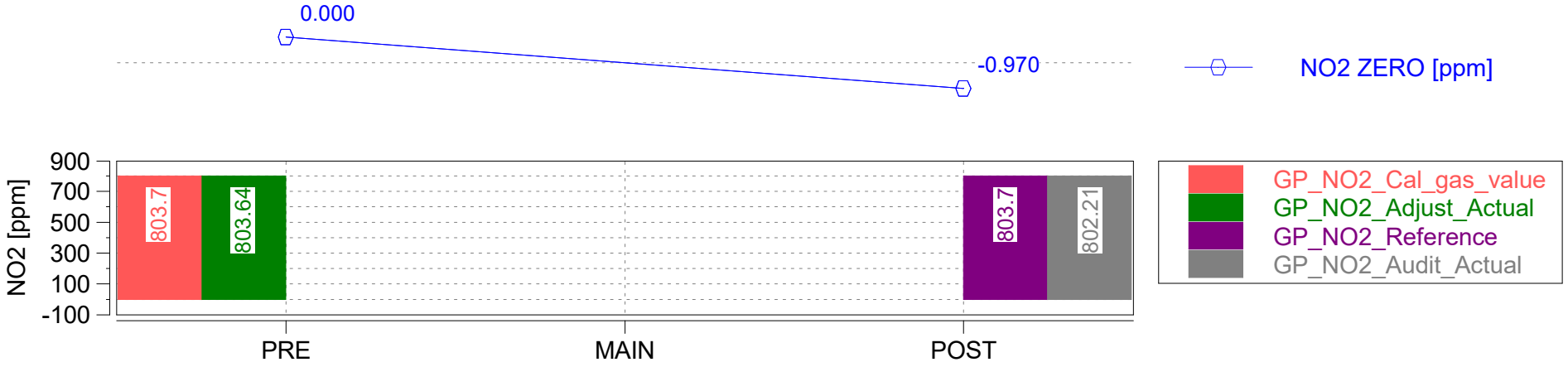
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: NO/NO2/NOx Zero - Span

'A2 Mountain Uphill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019



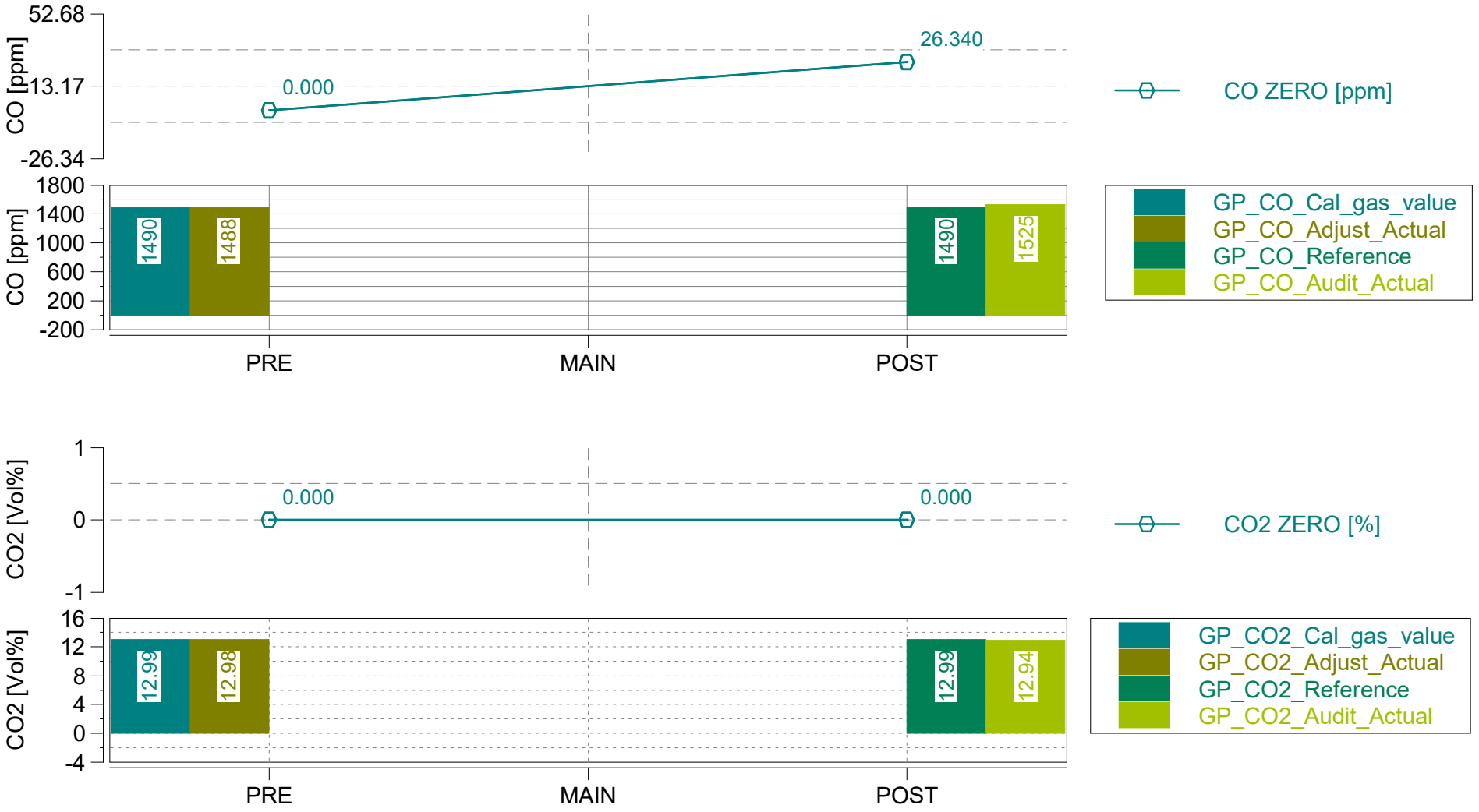

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: CO/CO2 Zero - Span

'A2 Mountain Uphill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019



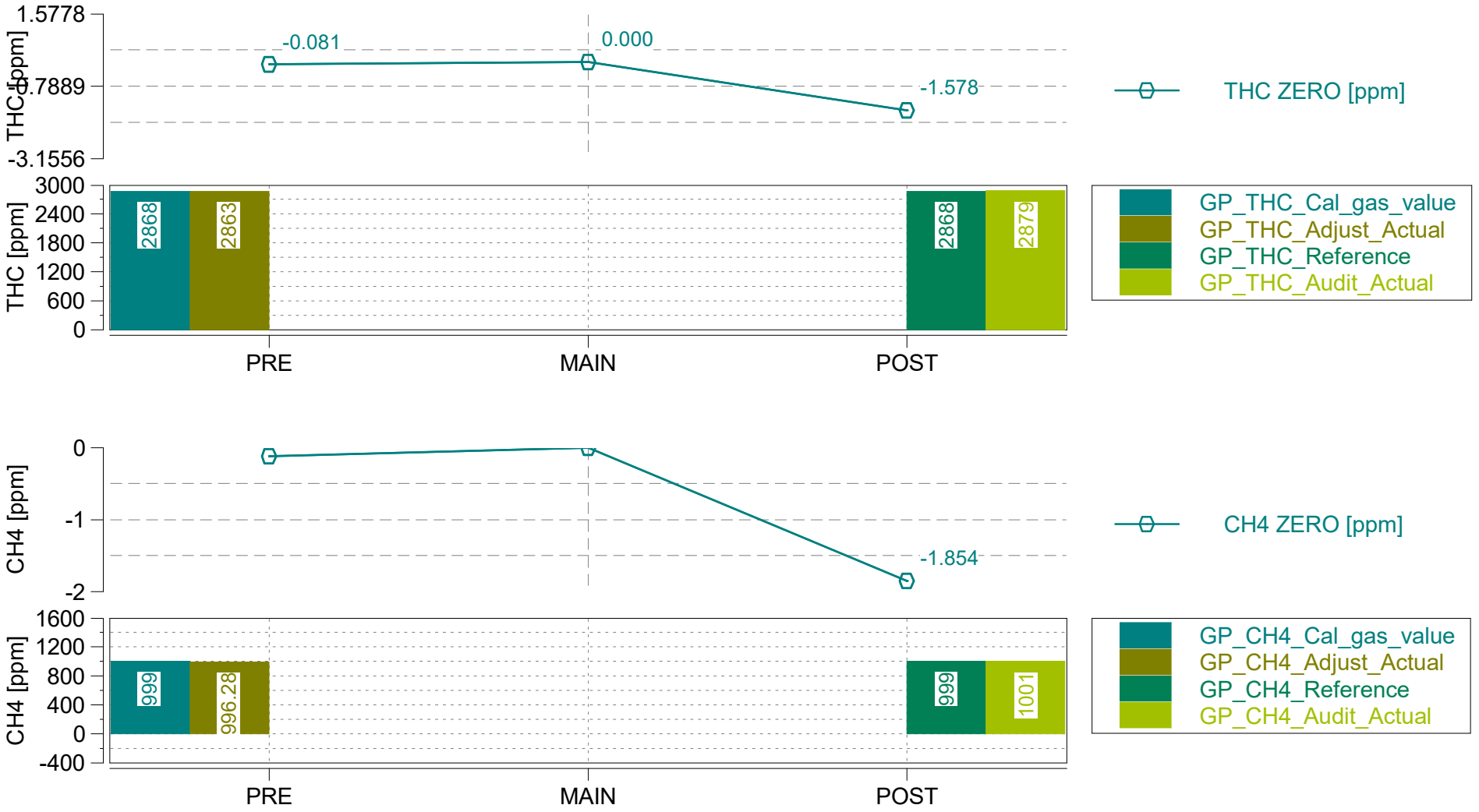

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: THC/CH4 Zero - Span

'A2 Mountain Uphill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

| § | criterium | condition | value | unit | pass/fail |
|---|---|---|---|---|---|
| **GAS Leak Check** | The leakage rate on the vacuum side shall not exceed 0.5 per cent of the in-use flow rate for the portion of the system being checked. | The leakage rate <= 0.5% | **0.30** | **%** | pass |
| **PN Leak Check** | n/a | n/a | **n/a** | **n/a** | n/a |
| **PM Leak Check** | n/a | n/a | **n/a** | **n/a** | n/a |

GAS PEMS Devices

| | |
|---|---|
| Device ID | AVL492 |
| Serial Number | 0246 |
| Firmware Version | V1.10 |
| Main Test Date | 2021-02-18 |
| Leak Check Age [days] | 0 |

| | |
|---|---|
| Device ID | AVL4925 |
| Serial Number | 145 |
| Firmware Version | 1.17.0.3 |

EFM

| | |
|---|---|
| Device ID | AVL495 |
| Serial Number | 00826 |
| Serial Number Tube | 01080 |
| Firmware Version | V1.10 |

System Control

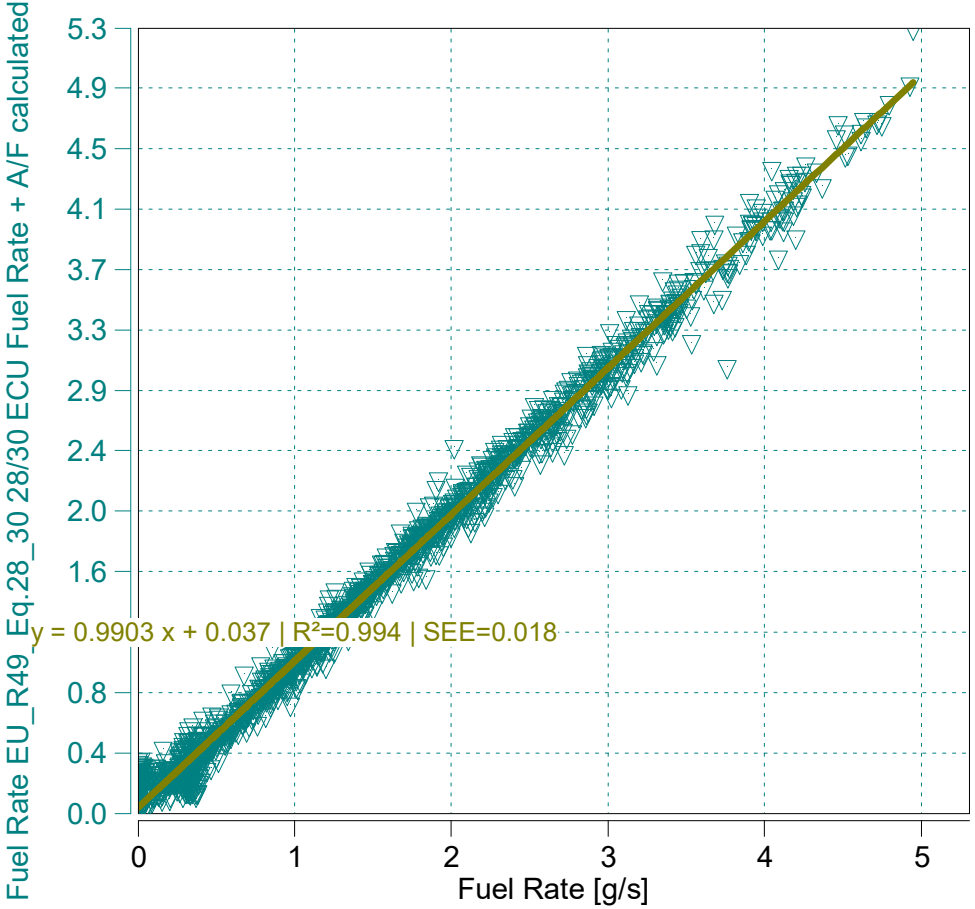
| | |
|---|---|
| SC Version | V2.6_212 |
| SC Serial Number | 60300923 |

Case: W177-4577
Page: Fuel Rate ECU vs. Calculated

'A2 Mountain Uphill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL

Concerto M.O.V.E, 2019




EU 582/2011/Appendix I/3.2.1 | Fuel Rate ECU and calculated

y = 0.9903 x + 0.037 | R²=0.994 | SEE=0.018
m = 0.99 (0.9 - 1.1 recommended)
R² = 0.99 (min 0.9 mandatory)

Data from - to [% of Maximum]

0 100

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: Trip Summary

'B1 Mountain Downhill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019

| | | |
|---|---|---|
| Trip Duration | 2000.00 | s |
| Trip Duration (a) | 2000.00 | s |
| Trip Distance | 17.99 | mi |
| Trip Distance (a) | 17.99 | mi |
| | | |
| Trip Fuel Cons. (b) | 0.90 | kg |
| Trip Fuel Cons. (ab) | 0.90 | kg |
| Trip Fuel Cons. EU (ac) | 0.97 | kg |
| Trip Fuel Cons. US (ac) | 0.97 | kg |
| | | |
| Trip Fuel Economy (b) | 56.57 | mpg_US |
| Trip Fuel Economy (ab) | 56.57 | mpg_US |
| Trip Fuel Economy EU (ac) | 52.38 | mpg_US |
| Trip Fuel Economy US (ac) | 52.23 | mpg_US |
| Trip Fuel Economy GGE (b) | 56.57 | mpg_US |
| Trip Fuel Economy GGE (ab) | 56.57 | mpg_US |
| Trip Fuel Economy EU GGE (ac) | 52.38 | mpg_US |
| Trip Fuel Economy US GGE (ac) | 52.23 | mpg_US |
| | | |
| Trip Av. Eng. Speed | 1543.15 | rpm |
| Trip Av. Torque | 16.77 | lbft |
| Trip Av. Power | 5.98 | hp |
| Trip Work | | |
| Trip Work (a) | 3.32 | hphr |
| | | |
| Trip Exhaust Mass | 21.84 | kg |
| Trip Exhaust Mass EU (ac) | 15.81 | kg |
| Trip Exhaust Mass US (ac) | 15.86 | kg |
| | | |
| Trip Av. Amb. Temperature | 66.52 | deg_F |
| Trip Av. Humidity | 15.12 | % |
| Trip Av. GPS Altitude | 554.90 | m |
| | | |
| Fuel Type | Petrol (E10) | |

| | | |
|---|---|---|
| ave THC | 13.45404 | ppm |
| ave NMHC | 8.93644 | ppm |
| ave CH4 | 4.51760 | ppm |
| ave CO | 128.08655 | ppm |
| ave CO2 | 7.08159 | % |
| ave NOx | 8.43354 | ppm |
| ave PM | n/a | mg/m3 |
| ave Soot meas | n/a | mg/m3 |
| ave Soot | n/a | mg/m3 |
| ave PN | n/a | #/cm3 |
| | | |
| tot THC | 0.17860 | g |
| tot NMHC | 0.11232 | g |
| tot CH4 | 0.07859 | g |
| tot CO | 3.22900 | g |
| tot CO2 | 2954.85578 | g |
| tot NO (d) | 0.16401 | g |
| tot NO2 | 0.03365 | g |
| tot NOx | 0.19764 | g |
| tot Soot | n/a | g |
| tot Soot meas | n/a | g |
| tot PM | n/a | g |
| tot PN | n/a | # |
| | | |
| PM measurement type | 0.00000 | - |
| tot Soot on PM filter (estim.) | 0.00000 | mg |
| Soot --> PM simple scaling factor | 1.00000 | - |
| | | |
| Trip Av. Veh. Speed | 32.38886 | mi/hr |
| | | |
| Trip Distance Share Urban | 25.79912 | % distance |
| Trip Distance Share Rural | 66.86148 | % distance |
| Trip Distance Share Motorway | 7.33941 | % distance |

| | | |
|---|---|---|
| BS CO2 | 889.68790 | g/hphr |
| BS CO | 0.97223 | g/hphr |
| BS THC | 0.05377 | g/hphr |
| BS NMHC | 0.03382 | g/hphr |
| BS CH4 | 0.02366 | g/hphr |
| BS NO (d) | 0.04938 | g/hphr |
| BS NO2 | 0.01013 | g/hphr |
| BS NOx | 0.05951 | g/hphr |
| BS Soot | n/a | g/hphr |
| BS Soot meas | n/a | g/hphr |
| BS PM | n/a | g/hphr |
| BS PN | n/a | #/hpr |
| | | |
| DS CO2 | 164.21512 | g/mi |
| DS CO | 0.17945 | g/mi |
| DS THC | 0.00993 | g/mi |
| DS NMHC | 0.00624 | g/mi |
| DS CH4 | 0.00437 | g/mi |
| DS NO (d) | 0.00911 | g/mi |
| DS NO2 | 0.00187 | g/mi |
| DS NOx | 0.01098 | g/mi |
| DS Soot | n/a | g/mi |
| DS Soot meas | n/a | g/mi |
| DS PM | n/a | g/mi |
| DS PN | n/a | #/mi |
| | | |
| FS CO2 | 3282.82391 | g/kg |
| FS CO | 3.58739 | g/kg |
| FS THC | 0.19842 | g/kg |
| FS NMHC | 0.12479 | g/kg |
| FS CH4 | 0.08732 | g/kg |
| FS NO (d) | 0.18222 | g/kg |
| FS NO2 | 0.03738 | g/kg |
| FS NOx | 0.21958 | g/kg |
| FS Soot | n/a | g/kg |
| FS Soot meas | n/a | g/kg |
| FS PM | n/a | g/kg |
| FS PN | n/a | #/kg |

(a) GAS PEMS measurement state only, (b) based on fuel rate input (ECU, Fuel Meter), (c) Based on A/F ratio (eq 28-32 - R49)
(d) NO calculated using molecular weight of NO2, GGE=Gasoline Gallon Equivalents

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

# Case: W177-4577
# Page: Trip Summary Drift Corrected

'B1 Mountain Downhill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019

| | | |
|---|---|---|
| Trip Duration | 2000.00 | s |
| Trip Duration (a) | 2000.00 | s |
| Trip Distance | 17.99 | mi |
| Trip Distance (a) | 17.99 | mi |
| | | |
| Trip Fuel Cons. (b) | 0.90 | kg |
| Trip Fuel Cons. (ab) | 0.90 | kg |
| Trip Fuel Cons. EU (ac) | 0.97 | kg |
| Trip Fuel Cons. US (ac) | 0.97 | kg |
| | | |
| Trip Fuel Economy (b) | 56.57 | mpg_US |
| Trip Fuel Economy (ab) | 56.57 | mpg_US |
| Trip Fuel Economy EU (ac) | 52.38 | mpg_US |
| Trip Fuel Economy US (ac) | 52.23 | mpg_US |
| Trip Fuel Economy GGE (b) | 56.57 | mpg_US |
| Trip Fuel Economy GGE (ab) | 56.57 | mpg_US |
| Trip Fuel Economy EU GGE (ac) | 52.38 | mpg_US |
| Trip Fuel Economy US GGE (ac) | 52.23 | mpg_US |
| | | |
| Trip Av. Eng. Speed | 1543.15 | rpm |
| Trip Av. Torque | 16.77 | lbft |
| Trip Av. Power | 5.98 | hp |
| Trip Work | | |
| Trip Work (a) | 3.32 | hphr |
| | | |
| Trip Exhaust Mass | 21.84 | kg |
| Trip Exhaust Mass EU (ac) | 15.81 | kg |
| Trip Exhaust Mass US (ac) | 15.86 | kg |
| | | |
| Trip Av. Amb. Temperature | 66.52 | deg_F |
| Trip Av. Humidity | 15.12 | % |
| Trip Av. GPS Altitude | 554.90 | m |
| | | |
| Fuel Type | Petrol (E10) | |

| | | |
|---|---|---|
| ave THC DC | 13.47891 | ppm |
| ave NMHC DC | 8.90197 | ppm |
| ave CH4 DC | 4.57694 | ppm |
| ave CO DC | 126.65425 | ppm |
| ave CO2 DC | 7.09799 | % |
| ave NOx DC | 8.43583 | ppm |
| ave PM | n/a | mg/m3 |
| ave Soot meas | n/a | mg/m3 |
| ave Soot | n/a | mg/m3 |
| ave PN DC | | |
| | | |
| tot THC DC | 0.17861 | g |
| tot NMHC DC | 0.11196 | g |
| tot CH4 DC | 0.07882 | g |
| tot CO DC | 3.19289 | g |
| tot CO2 DC | 2961.69573 | g |
| tot NO DC (d) | 0.16404 | g |
| tot NO2 DC | 0.03368 | g |
| tot NOx DC | 0.19770 | g |
| tot Soot | n/a | g |
| tot Soot meas | n/a | g |
| tot PM | n/a | g |
| tot PN DC | | |
| | | |
| PM measurement type | 0.00000 | - |
| tot Soot on PM filter (estim.) | 0.00000 | mg |
| Soot --> PM simple scaling factor | 1.00000 | - |
| | | |
| Trip Av. Veh. Speed | 32.38886 | mi/hr |
| | | |
| Trip Distance Share Urban | 25.79912 | % distance |
| Trip Distance Share Rural | 66.86148 | % distance |
| Trip Distance Share Motorway | 7.33941 | % distance |

| | | |
|---|---|---|
| BS CO2 DC | 891.74736 | g/hphr |
| BS CO DC | 0.96136 | g/hphr |
| BS THC DC | 0.05378 | g/hphr |
| BS NMHC DC | 0.03371 | g/hphr |
| BS CH4 DC | 0.02373 | g/hphr |
| BS NO DC (d) | 0.04939 | g/hphr |
| BS NO2 DC | 0.01014 | g/hphr |
| BS NOx DC | 0.05953 | g/hphr |
| BS Soot | n/a | g/hphr |
| BS Soot meas | n/a | g/hphr |
| BS PM | n/a | g/hphr |
| BS PN DC | | |
| | | |
| DS CO2 DC | 164.59525 | g/mi |
| DS CO DC | 0.17744 | g/mi |
| DS THC DC | 0.00993 | g/mi |
| DS NMHC DC | 0.00622 | g/mi |
| DS CH4 DC | 0.00438 | g/mi |
| DS NO DC (d) | 0.00912 | g/mi |
| DS NO2 DC | 0.00187 | g/mi |
| DS NOx DC | 0.01099 | g/mi |
| DS Soot | n/a | g/mi |
| DS Soot meas | n/a | g/mi |
| DS PM | n/a | g/mi |
| DS PN DC | | |
| | | |
| FS CO2 DC | 3290.42304 | g/kg |
| FS CO DC | 3.54728 | g/kg |
| FS THC DC | 0.19843 | g/kg |
| FS NMHC DC | 0.12438 | g/kg |
| FS CH4 DC | 0.08757 | g/kg |
| FS NO DC (d) | 0.18225 | g/kg |
| FS NO2 DC | 0.03742 | g/kg |
| FS NOx DC | 0.21965 | g/kg |
| FS Soot | n/a | g/kg |
| FS Soot meas | n/a | g/kg |
| FS PM | n/a | g/kg |
| FS PN DC | | |

(a) GAS PEMS measurement state only, (b) based on fuel rate input (ECU, Fuel Meter), (c) Based on A/F ratio (eq 28-32 - R49)
(d) NO calculated using molecular weight of NO2, GGE=Gasoline Gallon Equivalents

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

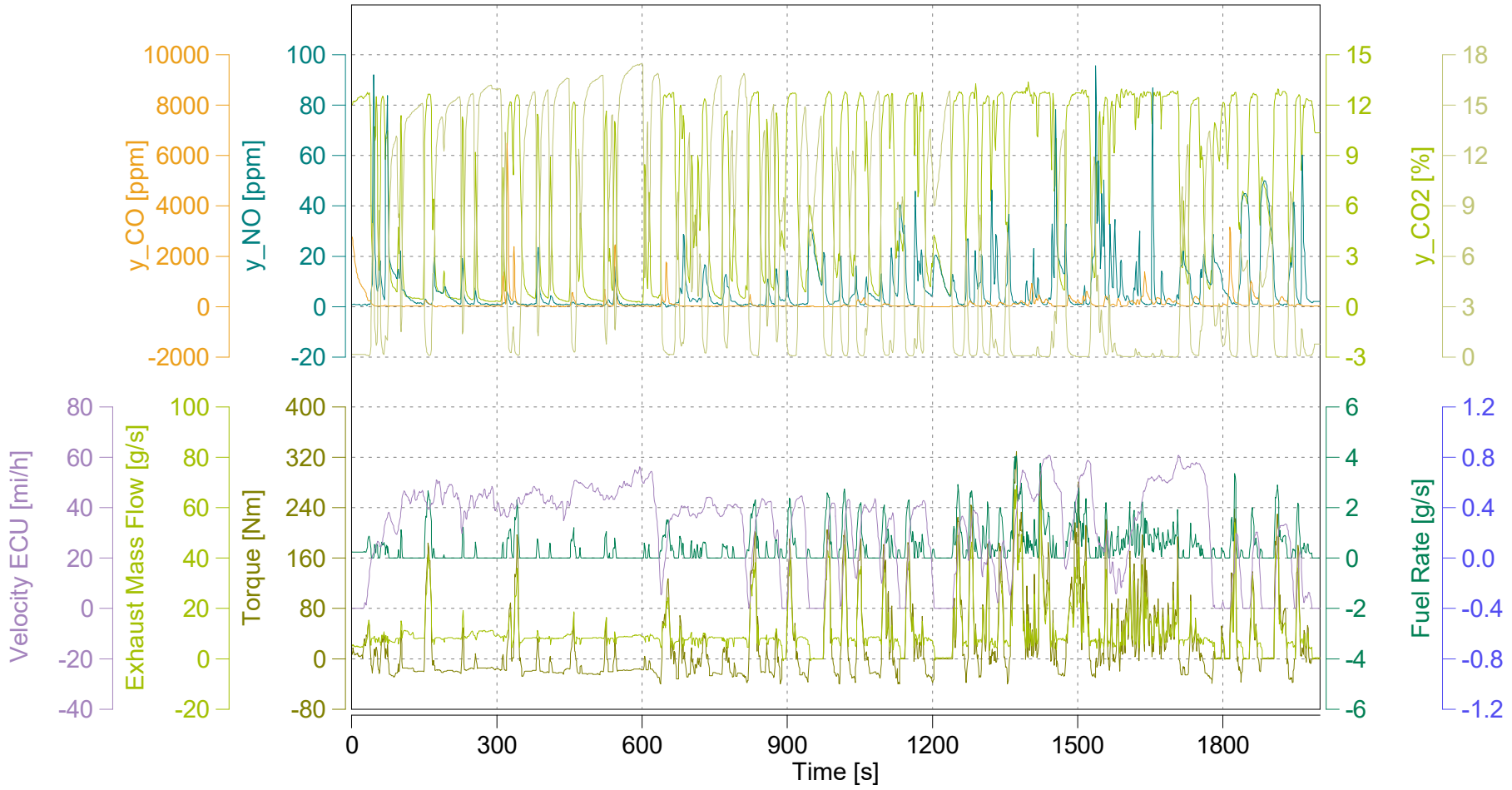
Case: W177-4577
Page: Time Alignment Check

'B1 Mountain Downhill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto

Absolute Time

y_THC
y_NO
y_CO2
y_O2
c_Soot
Fuel Rate
Exhaust Mass
Torque
Velocity ECU




AVL 492 Defa

THC
NO/NO2
CO/CO2
O2

Apply Defa

Alignment Plo

Reset Time
Reset Al
Apply Curr

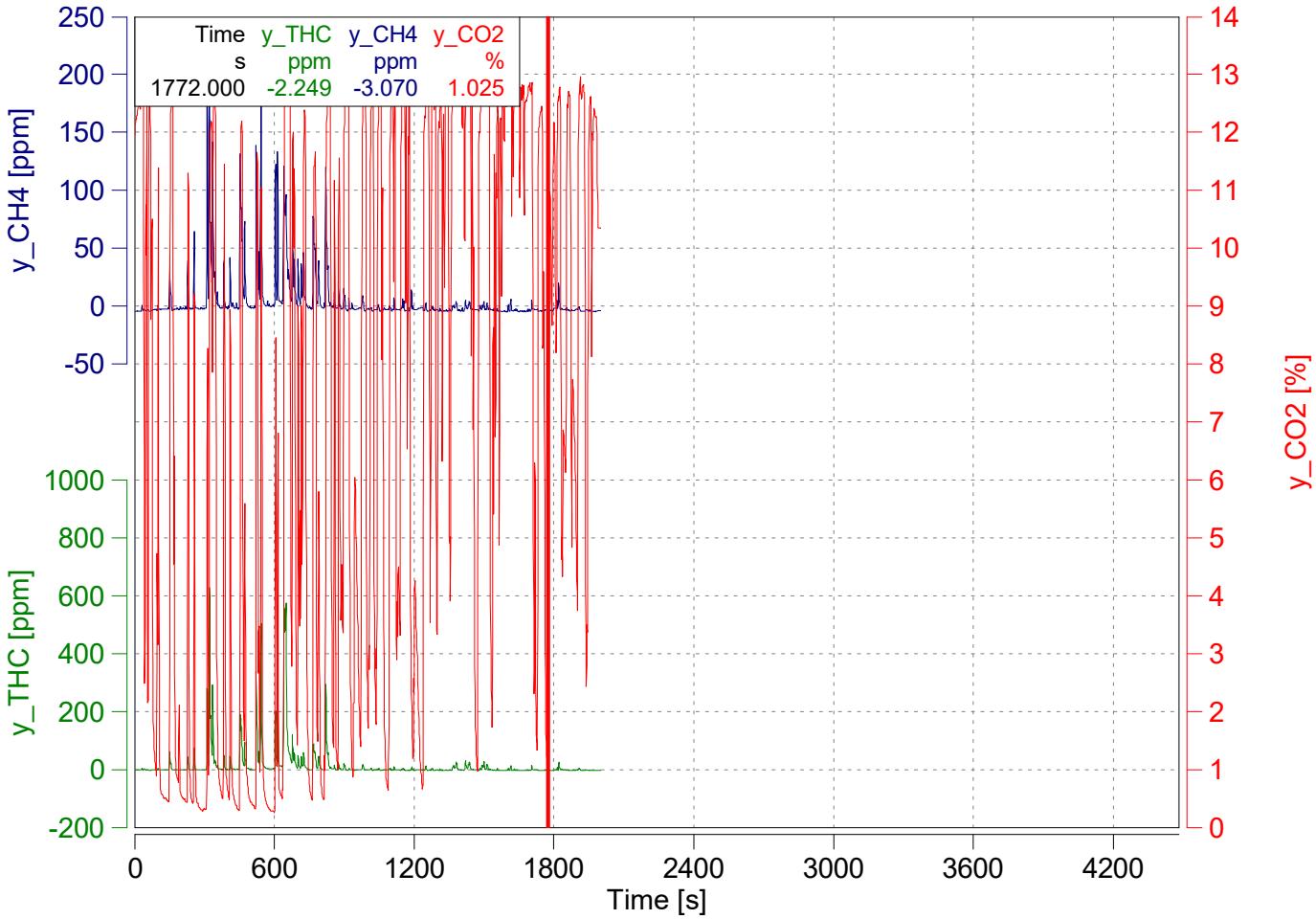
Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: Time Alignment of Gas Concentrations

'B1 Mountain Downhill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019




Absolute Time Shifts

| | | |
|---|---|---|
| y_THC | s | -5.2 |
| y_CH4 | s | -7.2 |

Reset Time Shifts in Plot

Apply Current Values

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

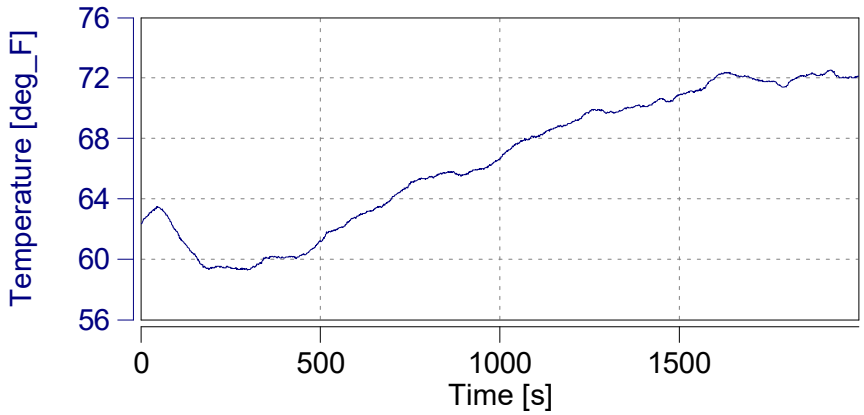
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

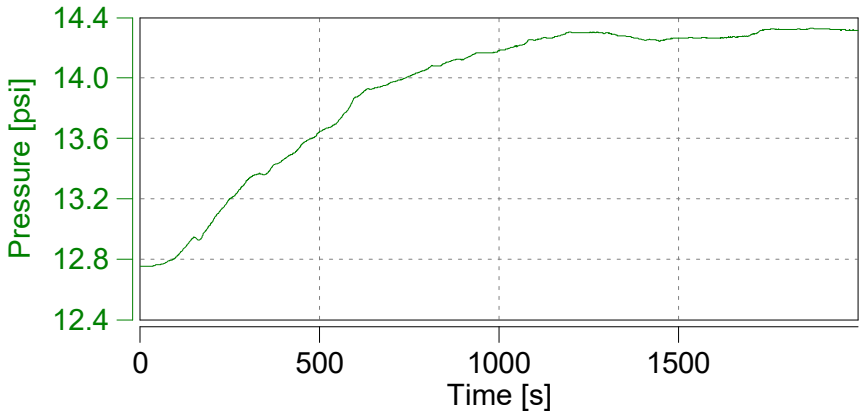
Case: W177-4577
Page: Ambient Conditions

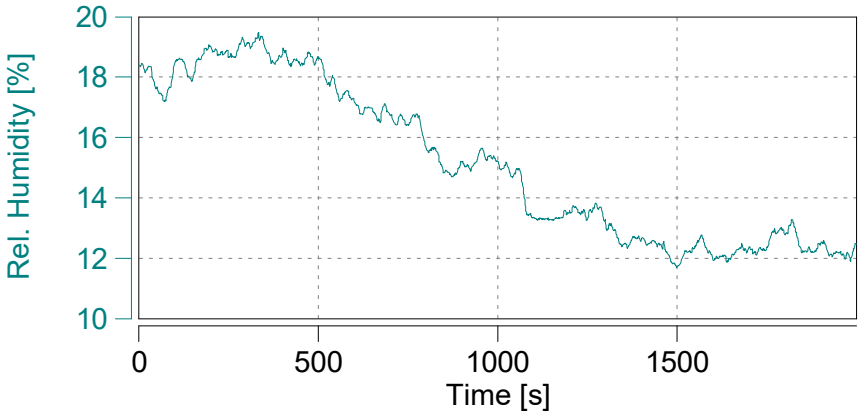
'B1 Mountain Downhill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

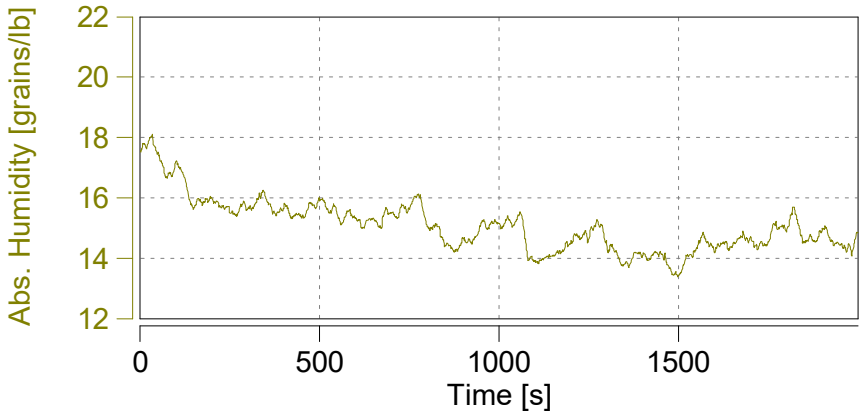
AVL

Concerto M.O.V.E, 2019



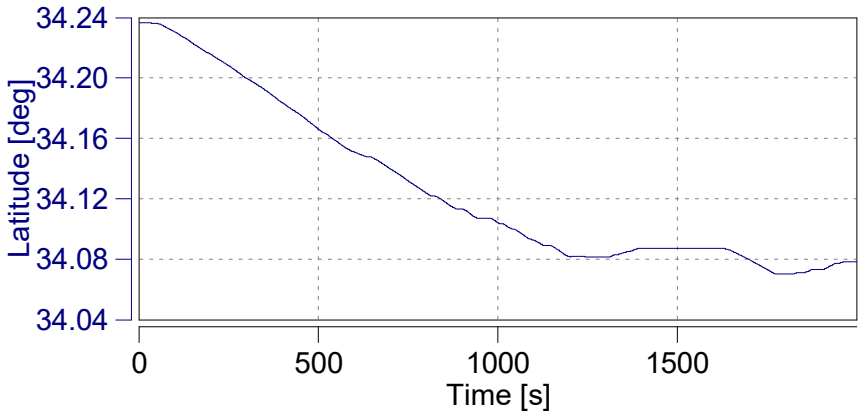



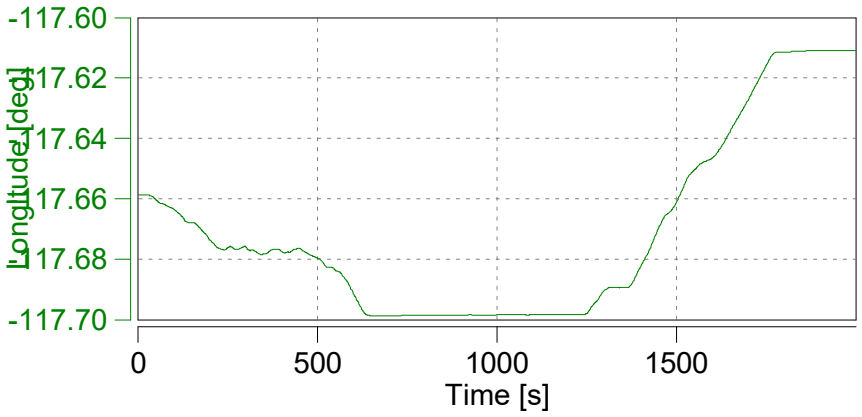

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

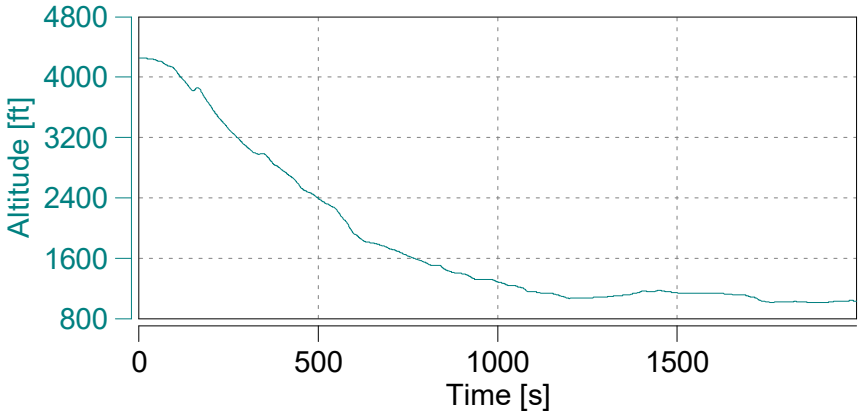
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

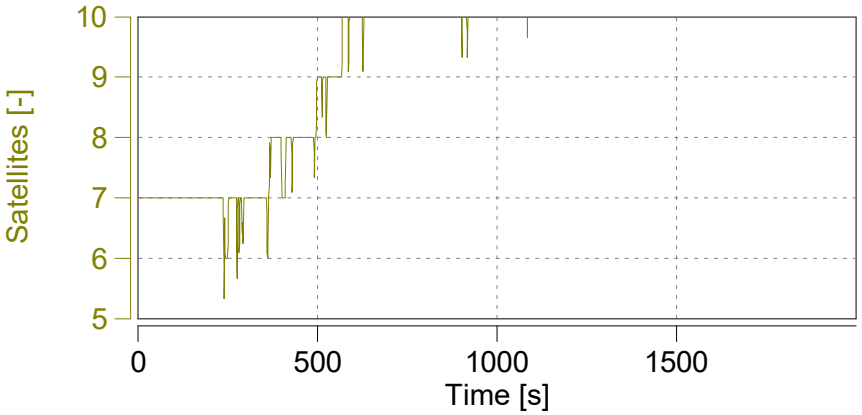
'B1 Mountain Downhill'
Start Date: 02/18/2021
Start Time: 10:14:32.0





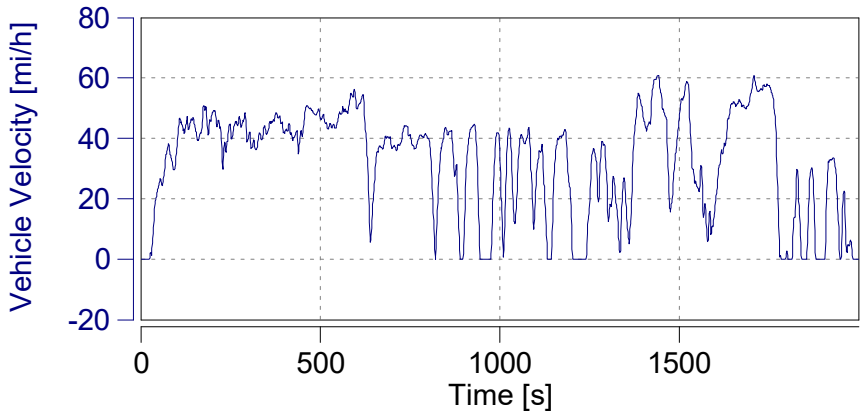



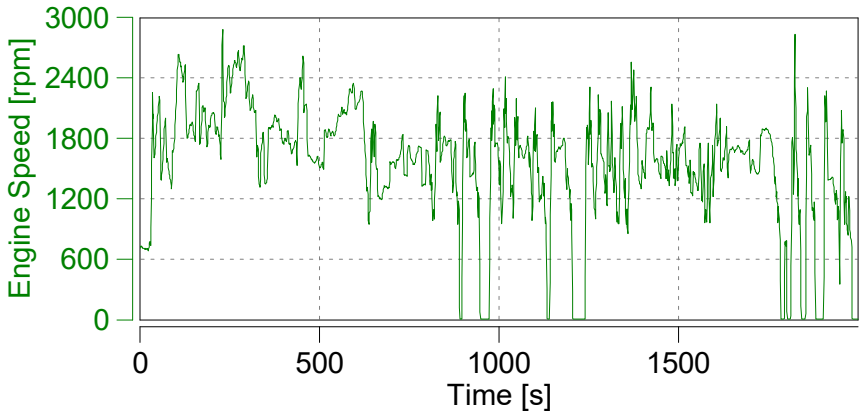
Case: W177-4577
Page: Engine (1)

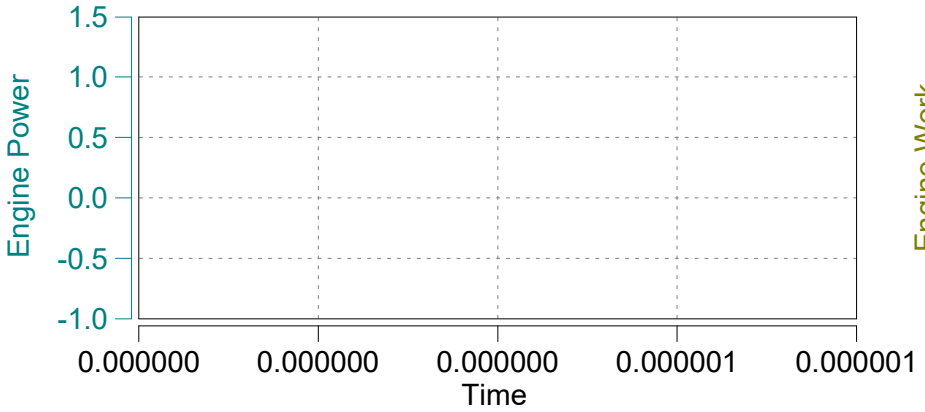
'B1 Mountain Downhill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

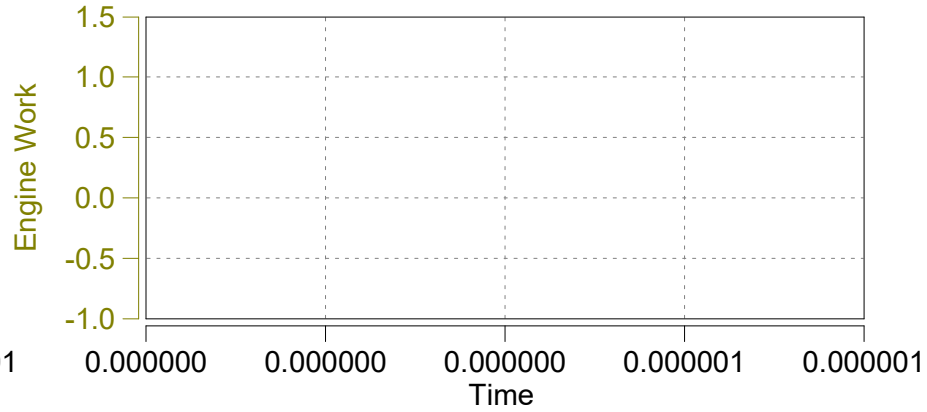
AVL

Concerto M.O.V.E, 2019



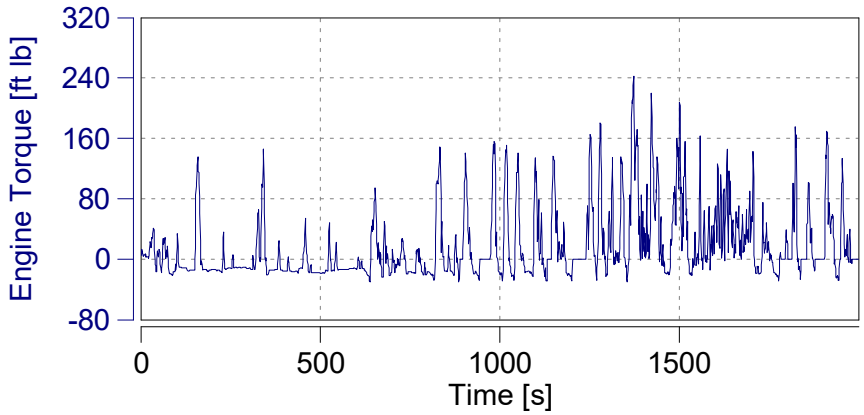

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

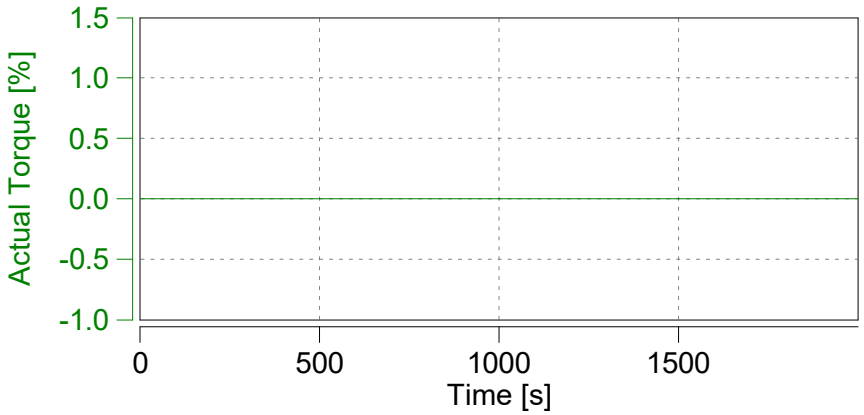
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

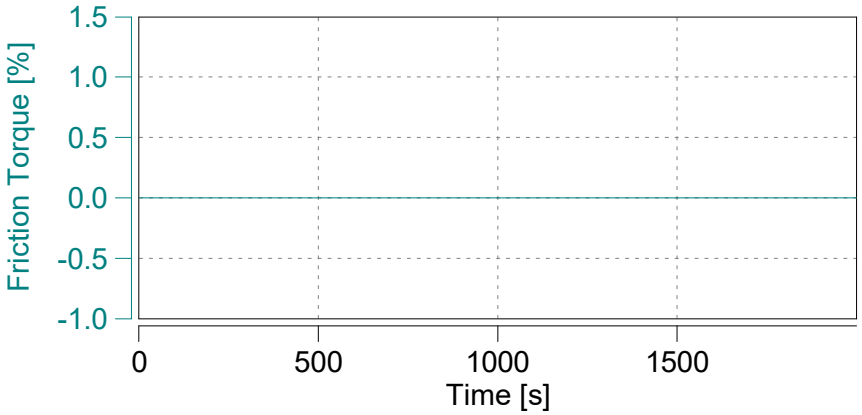
'B1 Mountain Downhill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

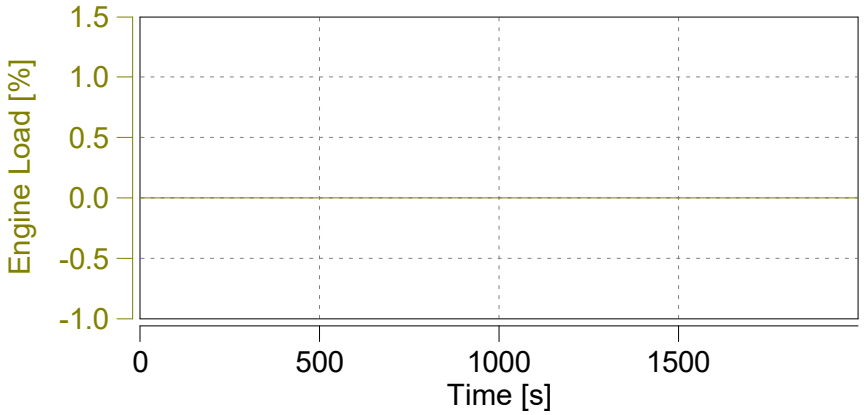
AVL

Concerto M.O.V.E, 2019



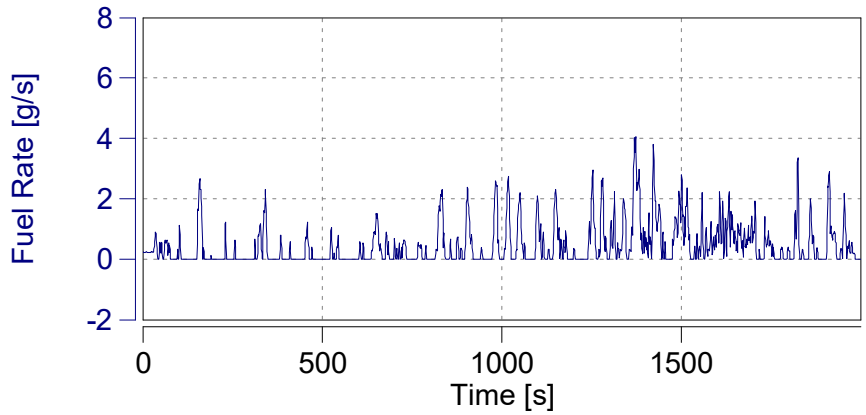

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

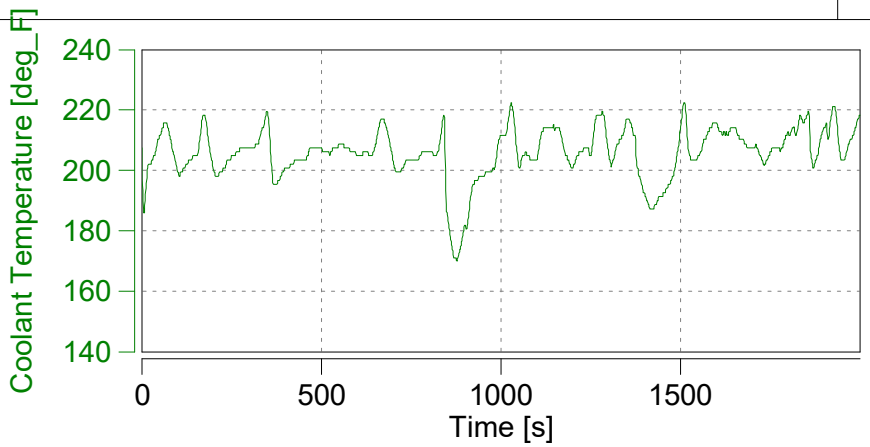
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

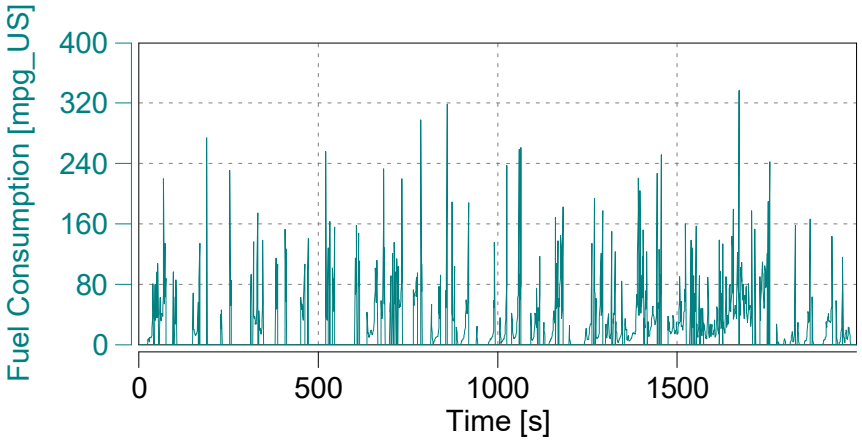
'B1 Mountain Downhill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

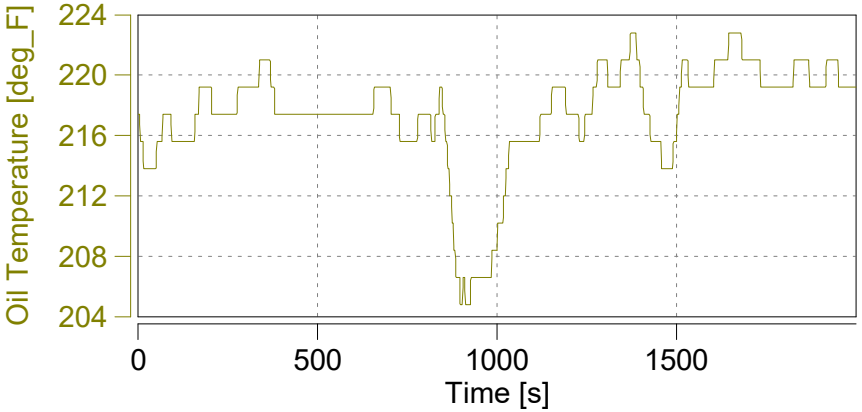
AVL

Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

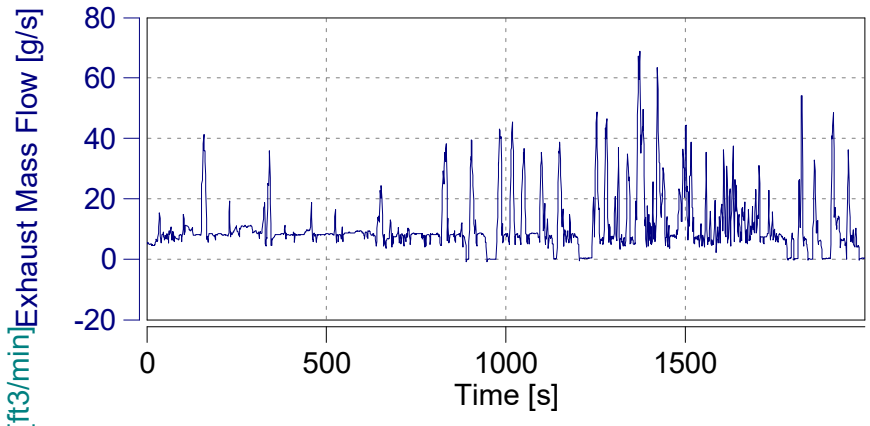
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

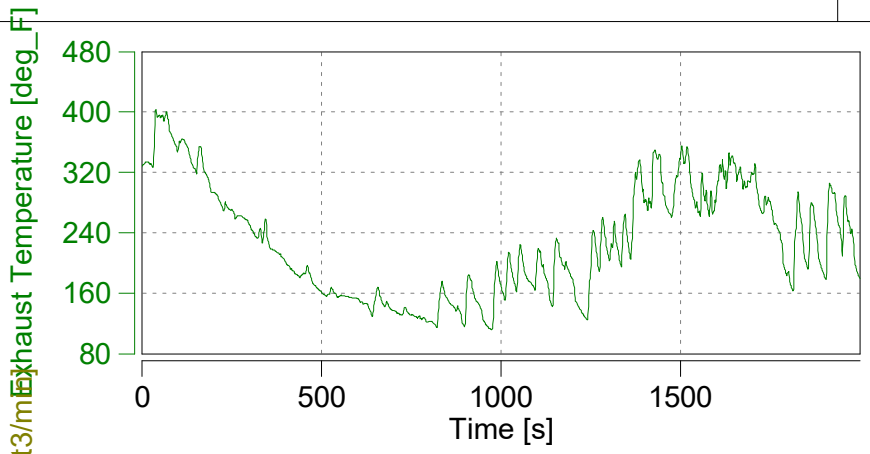
Case: W177-4577
Page: Exhaust Flow (1)

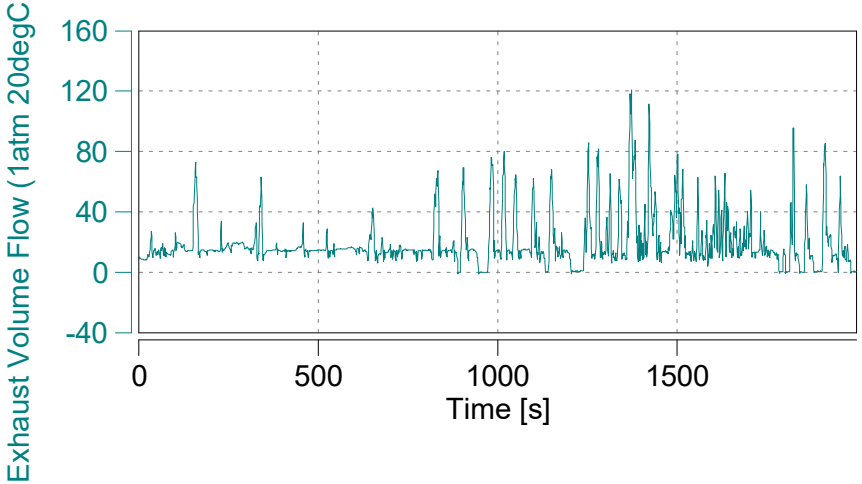
'B1 Mountain Downhill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

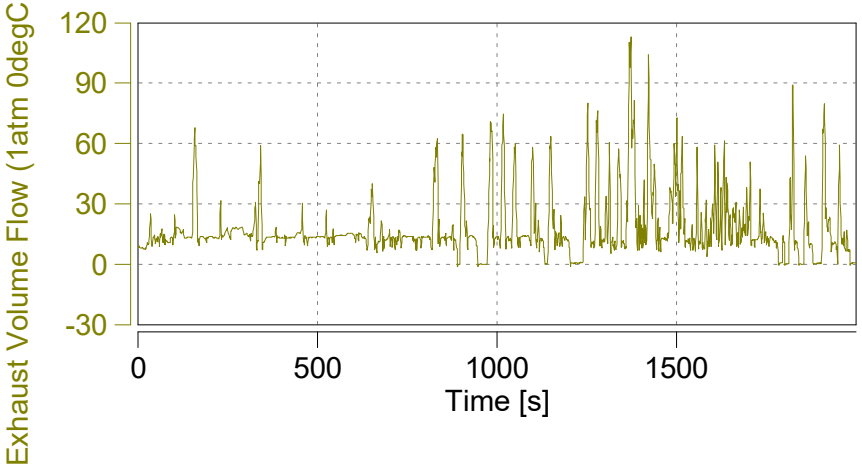
AVL

Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

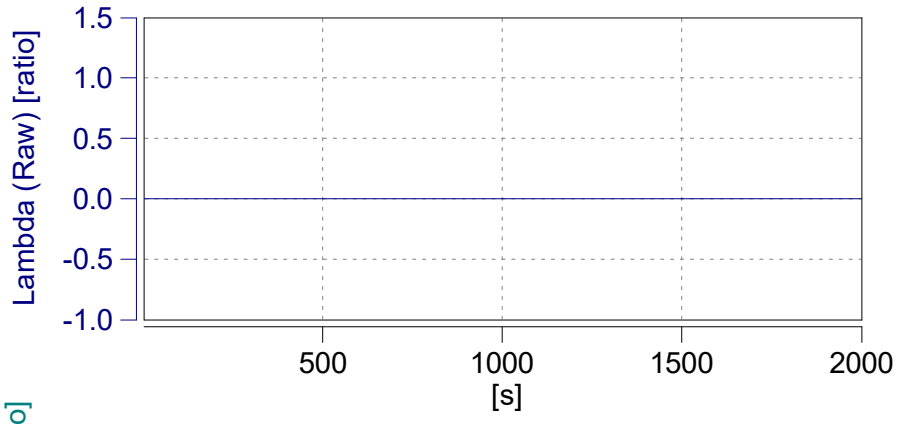
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

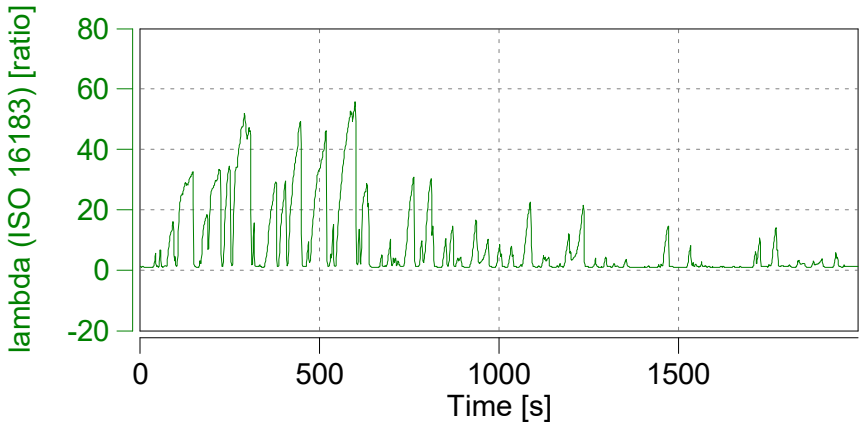
Case: W177-4577
Page: Exhaust Flow (2)

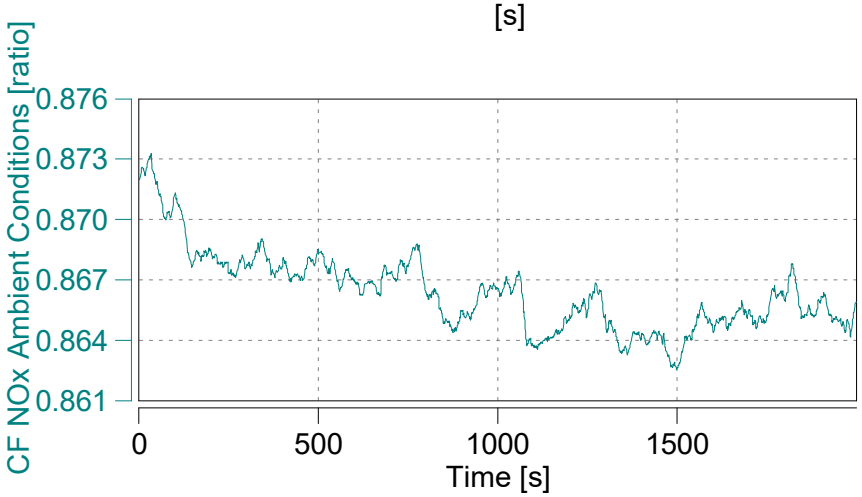
'B1 Mountain Downhill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

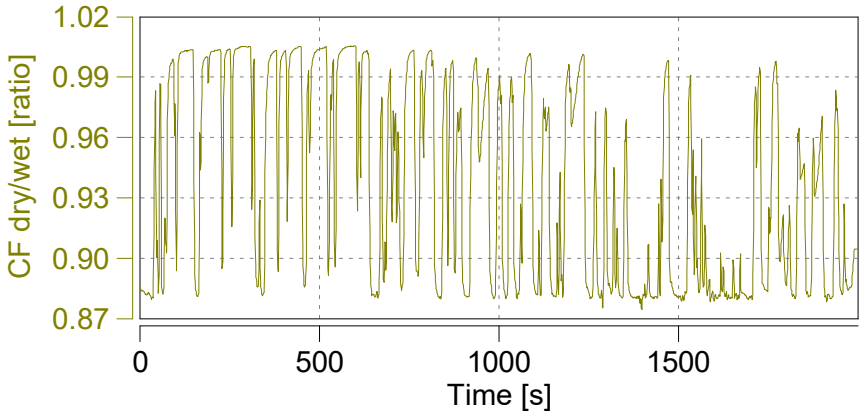
AVL

Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

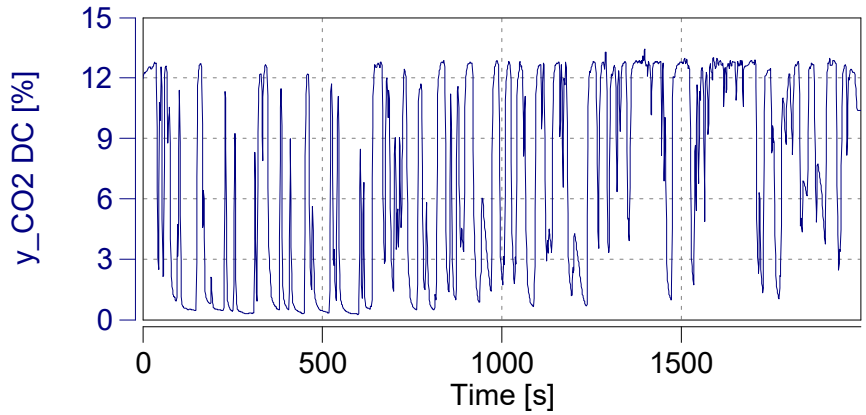
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

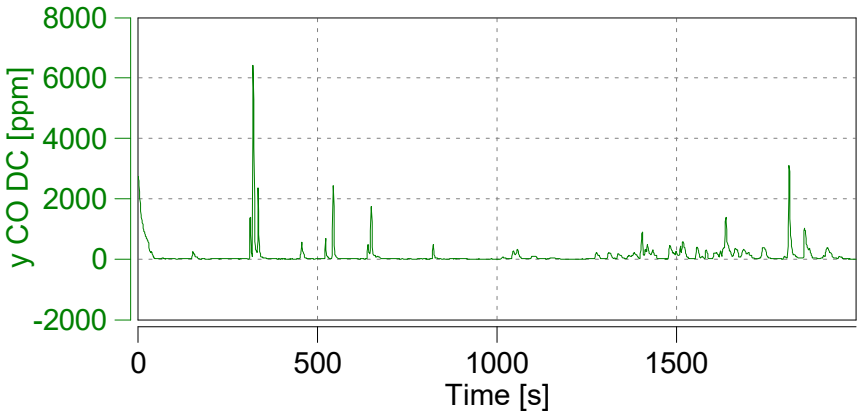
Case: W177-4577
Page: Corrected Emissions (1)

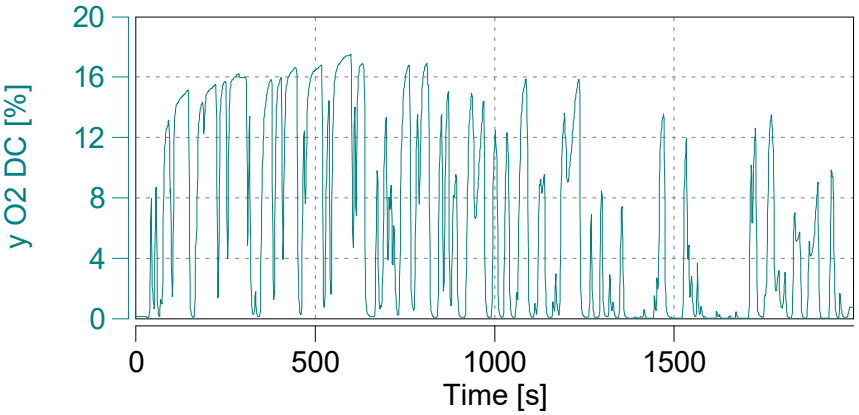
'B1 Mountain Downhill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

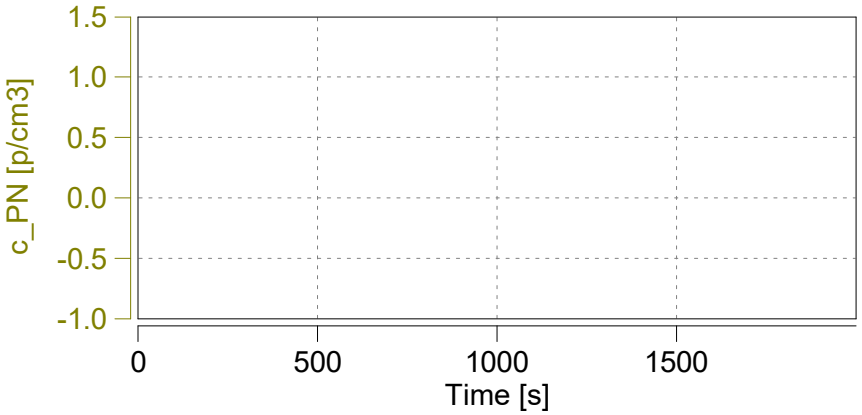
AVL

Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

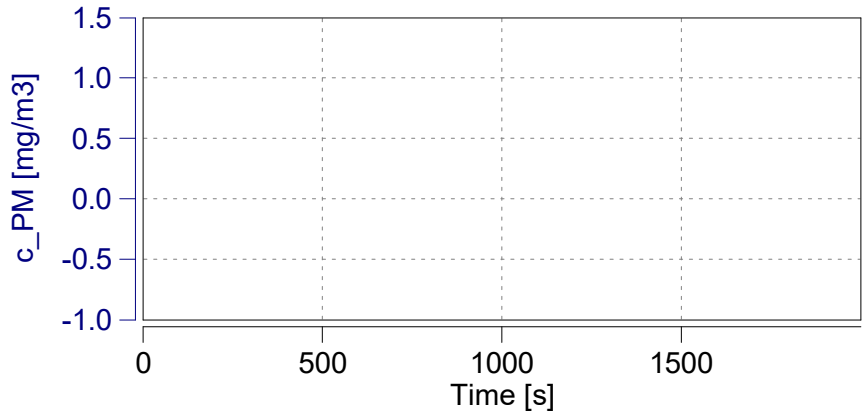
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

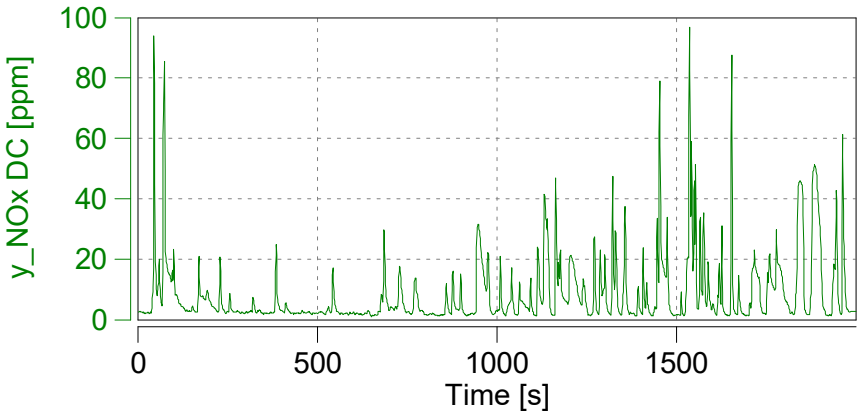
Case: W177-4577
Page: Corrected Emissions (2)

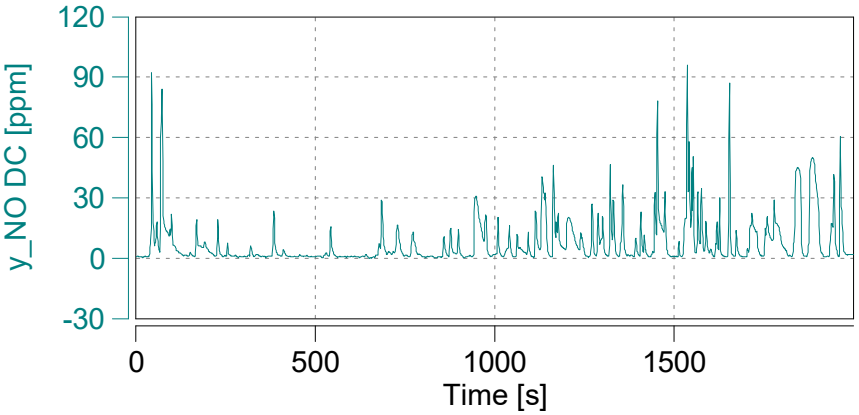
'B1 Mountain Downhill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

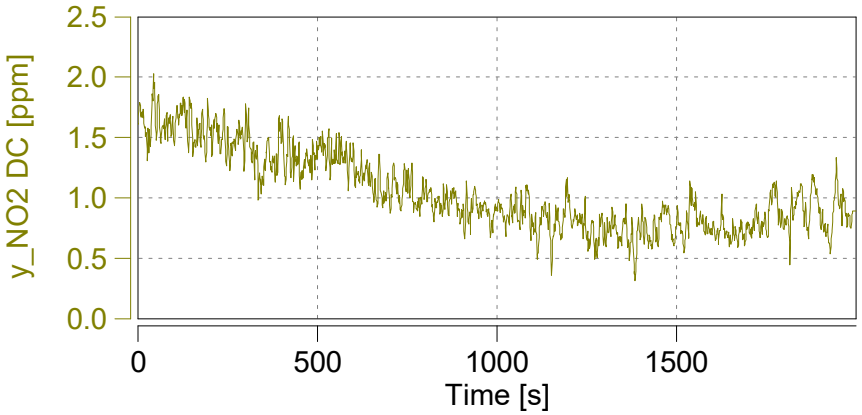
AVL

Concerto M.O.V.E, 2019



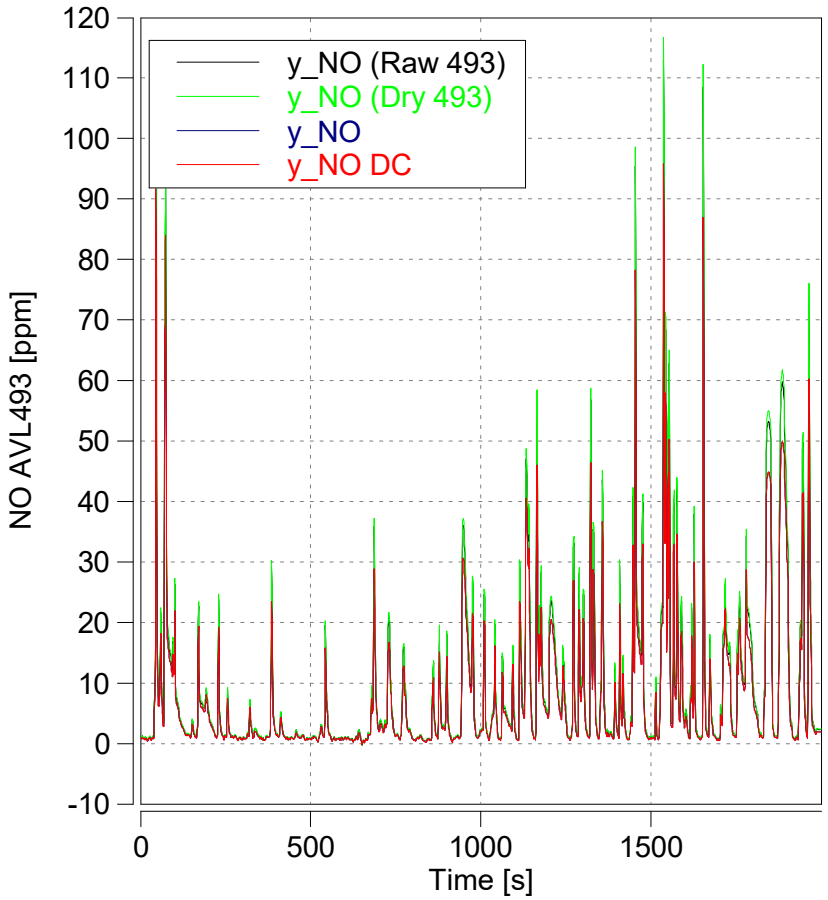

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

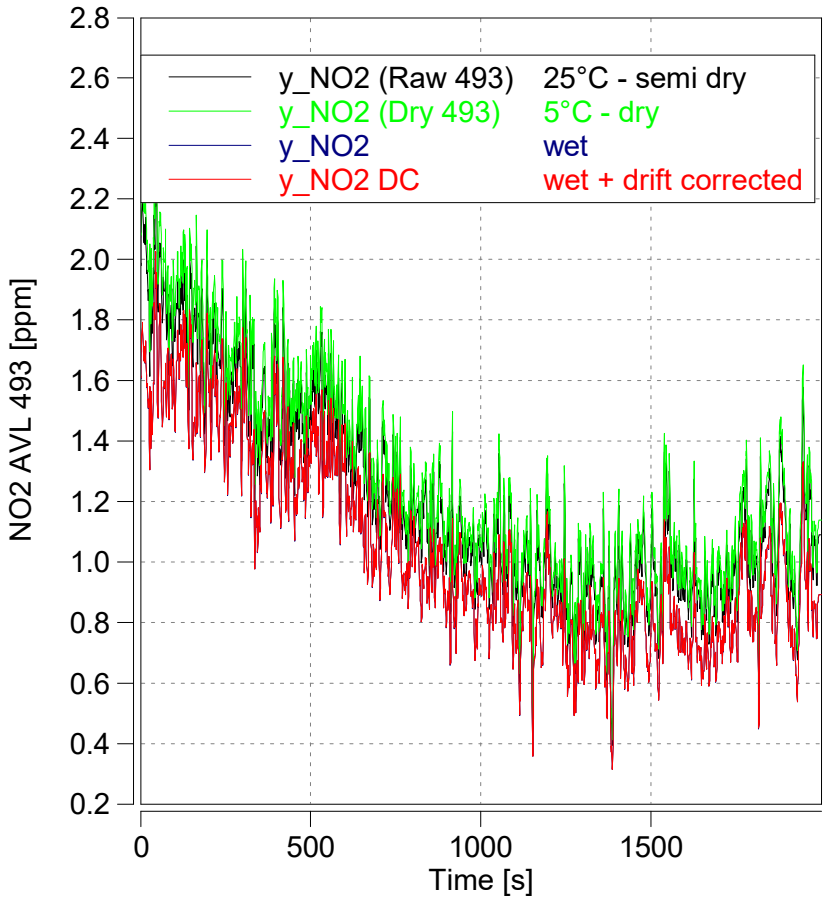
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: Corrected Emissions (3)

'B1 Mountain Downhill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019

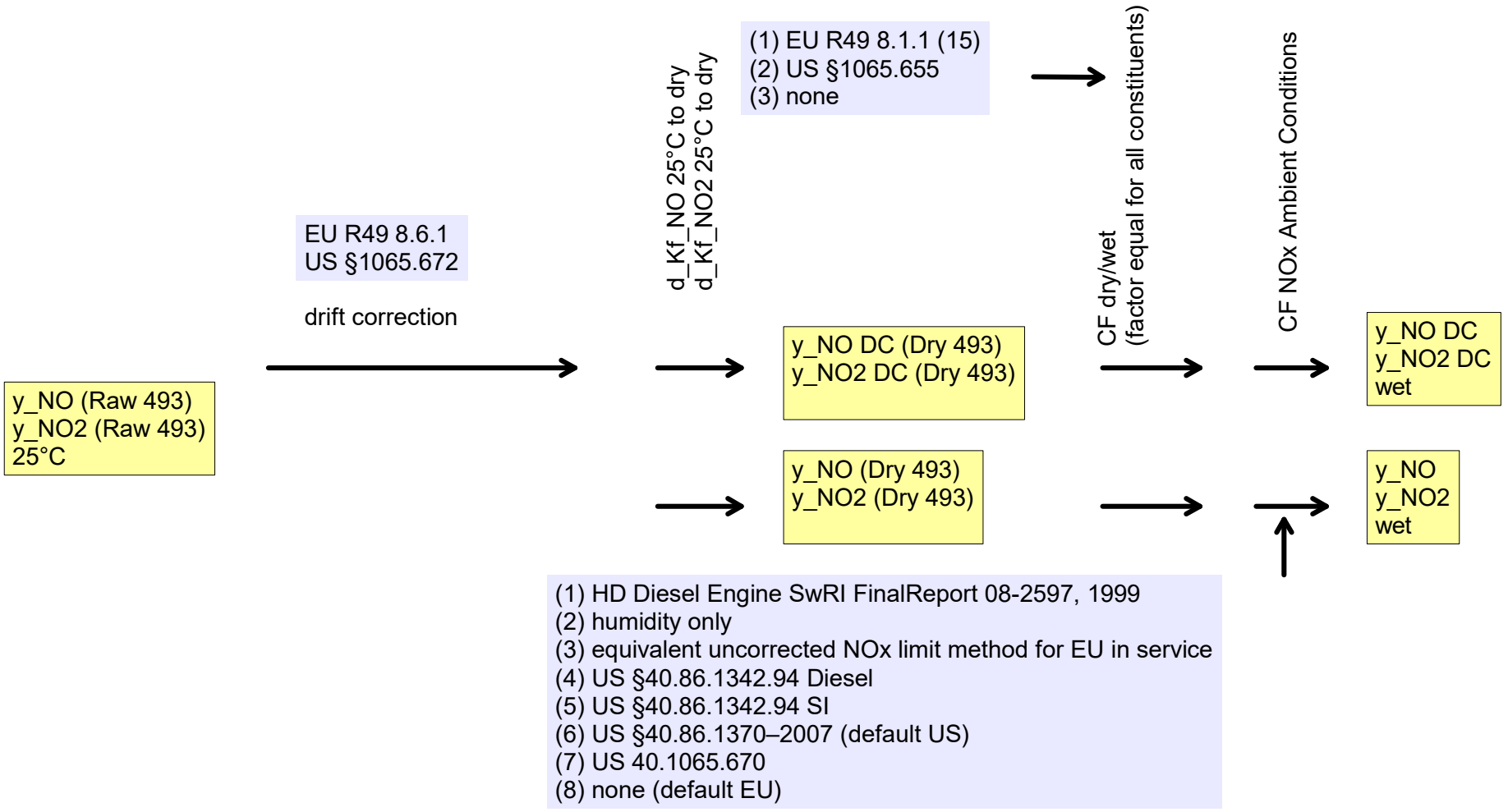



Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

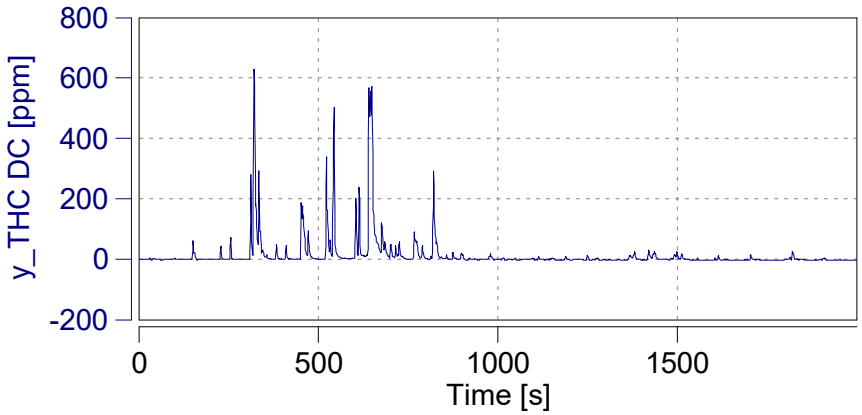
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

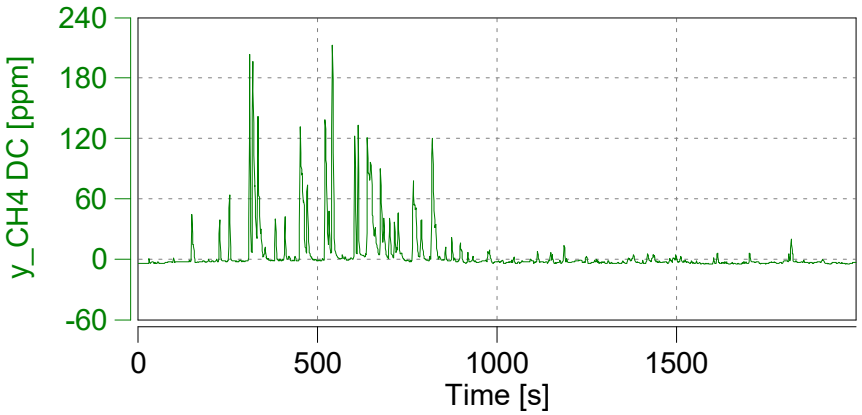
## NOx - AVL 493

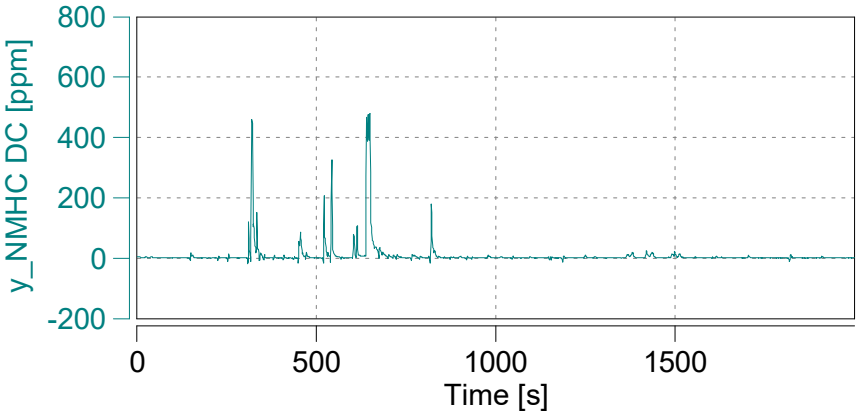

y_NO (Raw 493)
y_NO2 (Raw 493)
25°C
EU R49 8.6.1
US §1065.672
drift correction
d_Kf_NO 25°C to dry
d_Kf_NO2 25°C to dry
(1) EU R49 8.1.1 (15)
(2) US §1065.655
(3) none
y_NO DC (Dry 493)
y_NO2 DC (Dry 493)
y_NO (Dry 493)
y_NO2 (Dry 493)
CF dry/wet
(factor equal for all constituents)
CF NOx Ambient Conditions
y_NO DC
y_NO2 DC
wet
y_NO
y_NO2
wet
(1) HD Diesel Engine SwRI FinalReport 08-2597, 1999
(2) humidity only
(3) equivalent uncorrected NOx limit method for EU in service
(4) US §40.86.1342.94 Diesel
(5) US §40.86.1342.94 SI
(6) US §40.86.1370–2007 (default US)
(7) US 40.1065.670
(8) none (default EU)

'B1 Mountain Downhill'
Start Date: 02/18/2021
Start Time: 10:14:32.0





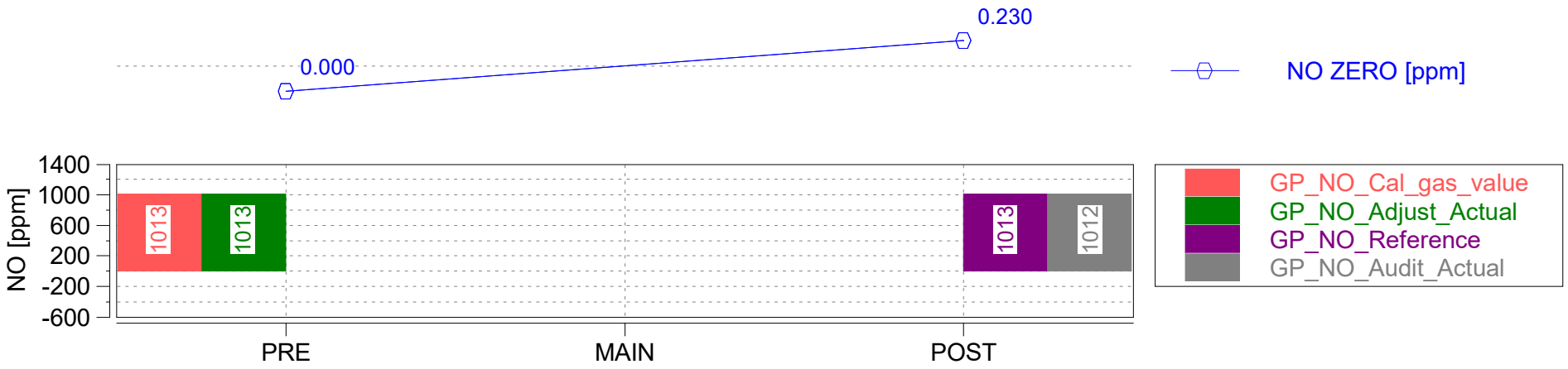



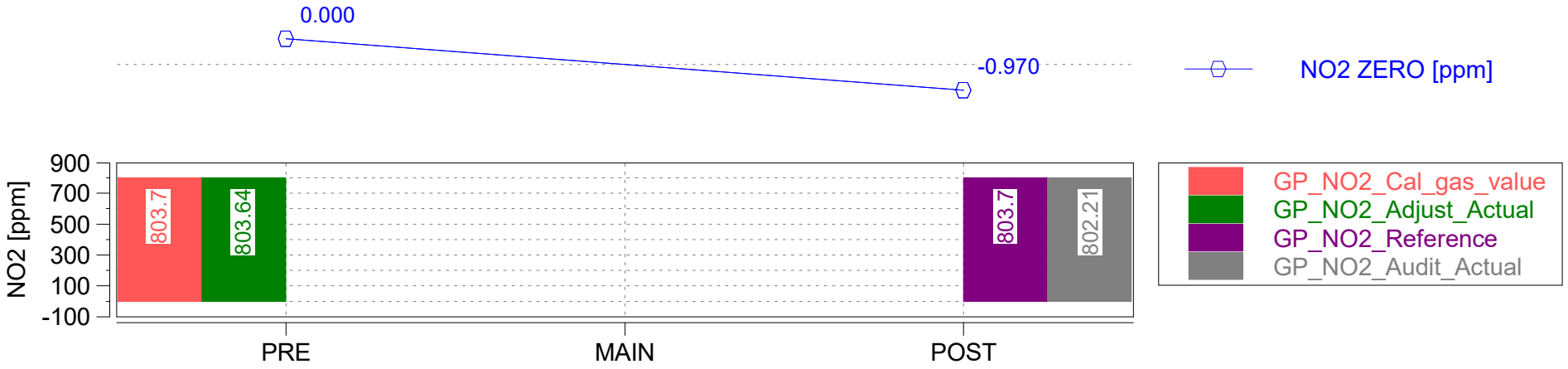



Case: W177-4577
Page: NO/NO2/NOx Zero - Span

'B1 Mountain Downhill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019



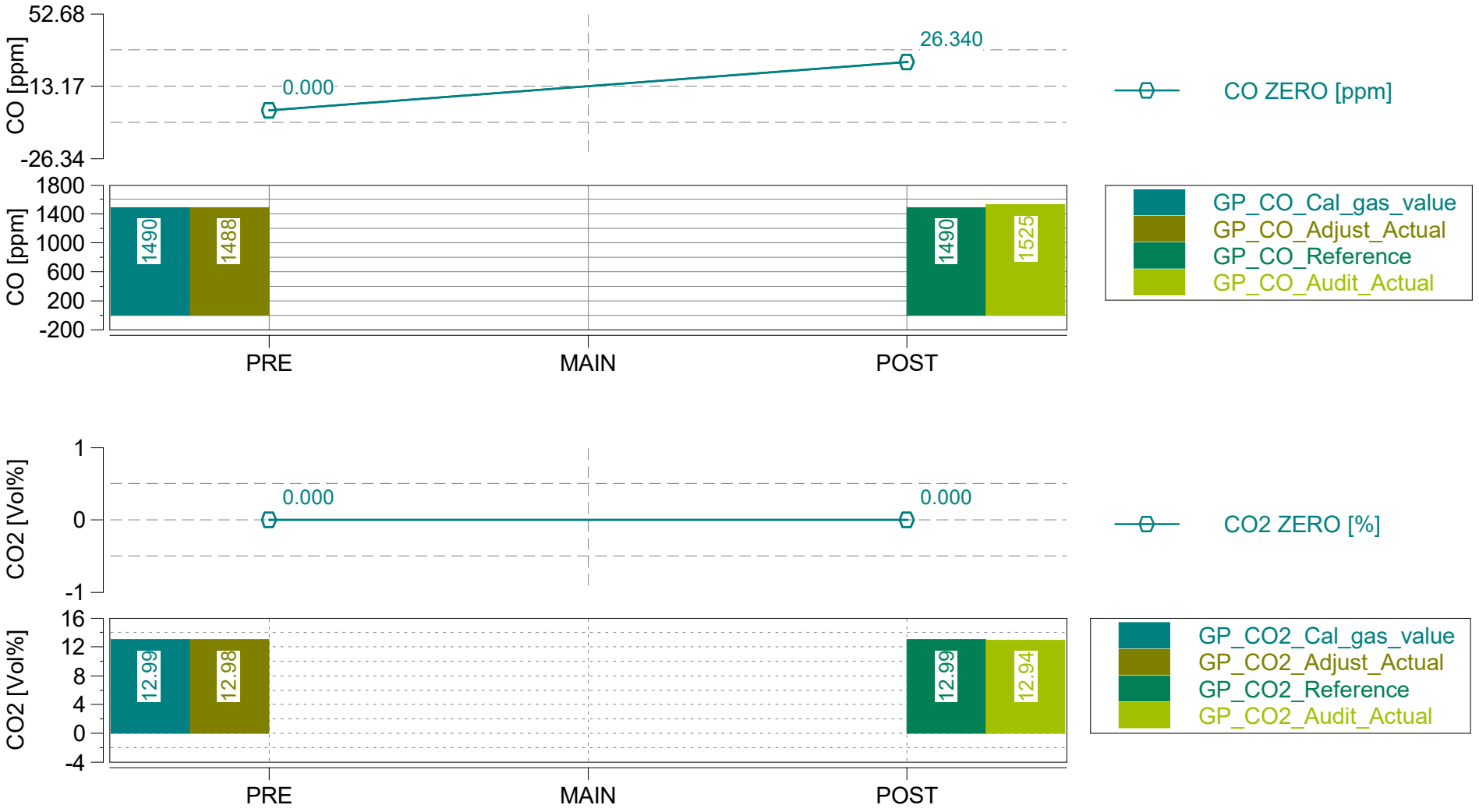

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: CO/CO2 Zero - Span

'B1 Mountain Downhill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019



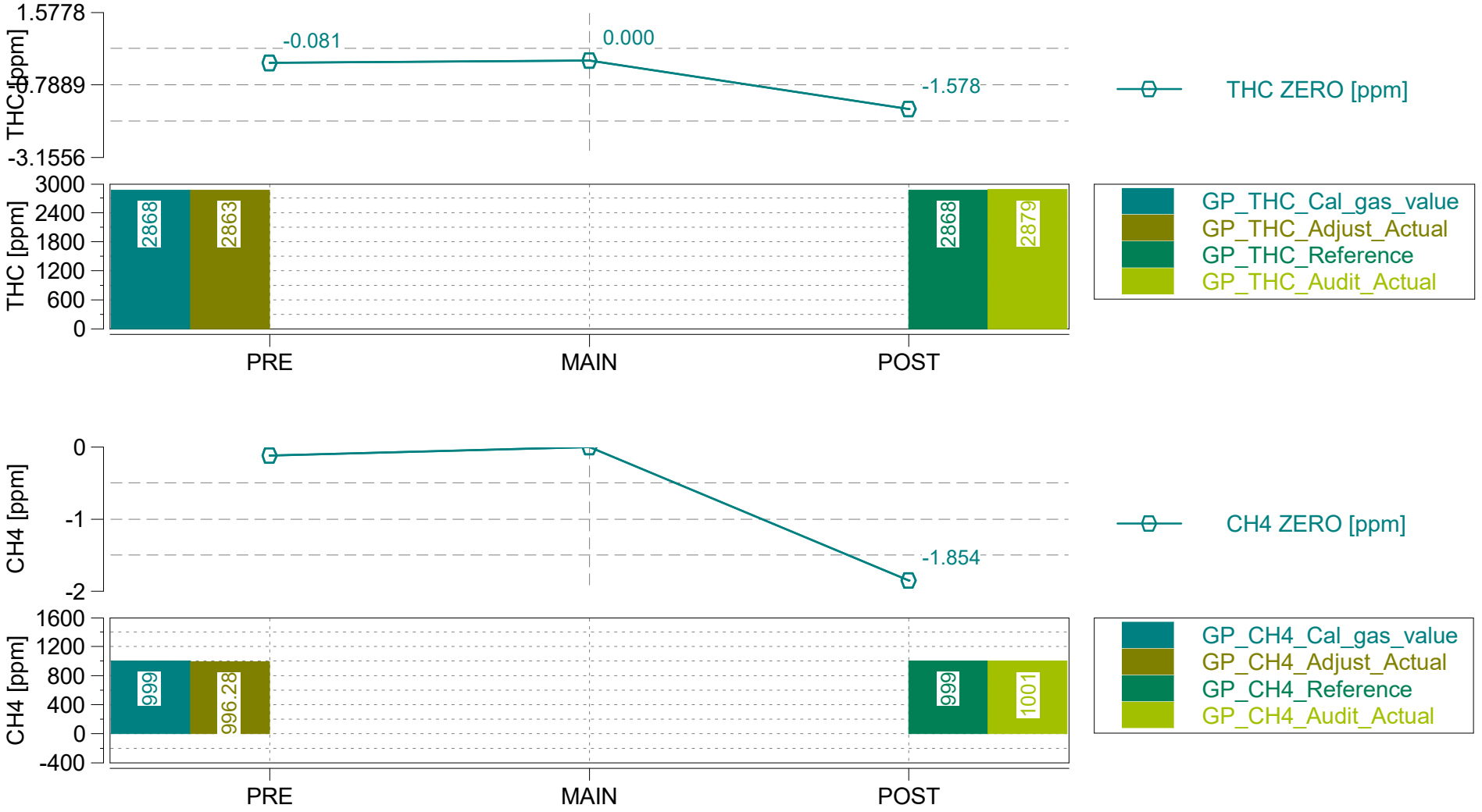

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: THC/CH4 Zero - Span

'B1 Mountain Downhill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

| § | criterium | condition | value | unit | pass/fail |
|---|---|---|---|---|---|
| **GAS Leak Check** | The leakage rate on the vacuum side shall not exceed 0.5 per cent of the in-use flow rate for the portion of the system being checked. | The leakage rate <= 0.5% | **0.30** | **%** | pass |
| **PN Leak Check** | n/a | n/a | **n/a** | **n/a** | n/a |
| **PM Leak Check** | n/a | n/a | **n/a** | **n/a** | n/a |

GAS PEMS Devices

| | |
|---|---|
| Device ID | AVL492 |
| Serial Number | 0246 |
| Firmware Version | V1.10 |
| Main Test Date | 2021-02-18 |
| Leak Check Age [days] | 0 |

| | |
|---|---|
| Device ID | AVL4925 |
| Serial Number | 145 |
| Firmware Version | 1.17.0.3 |

EFM

| | |
|---|---|
| Device ID | AVL495 |
| Serial Number | 00826 |
| Serial Number Tube | 01080 |
| Firmware Version | V1.10 |

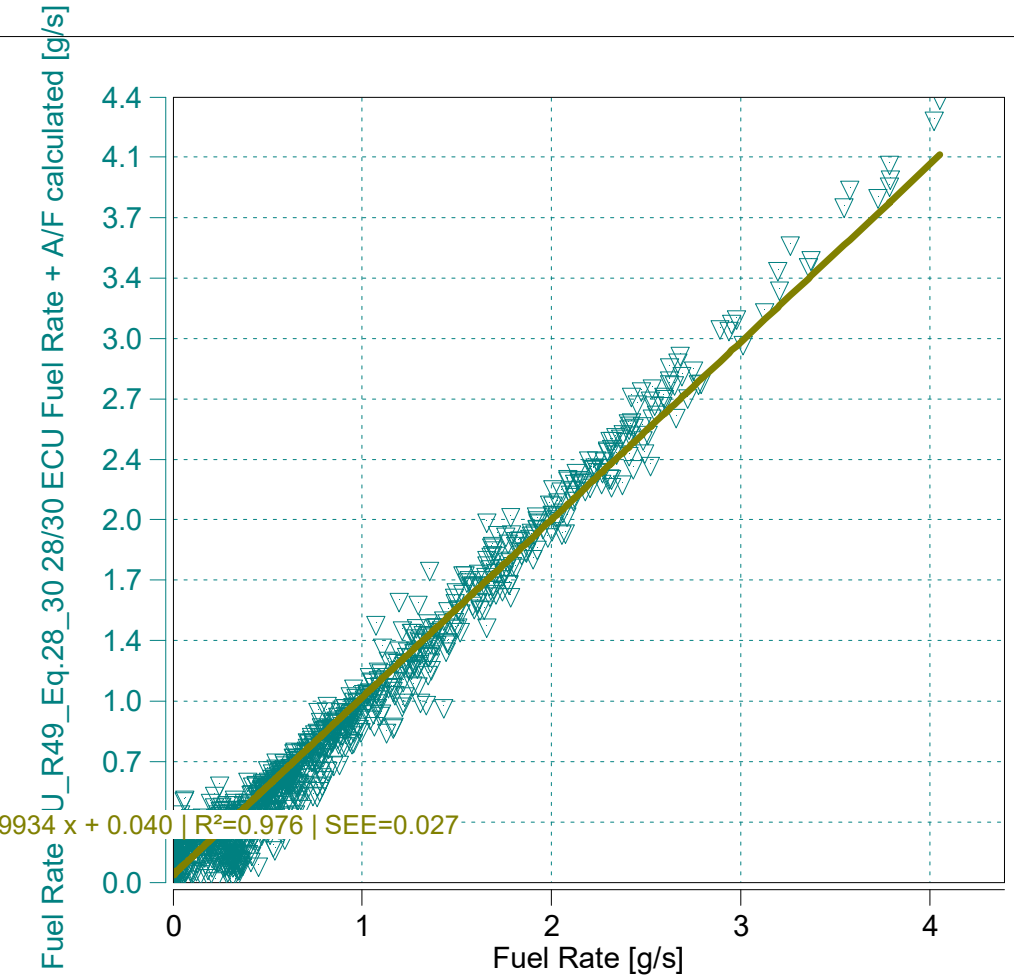
System Control

| | |
|---|---|
| SC Version | V2.6_212 |
| SC Serial Number | 60300923 |

Case: W177-4577
Page: Fuel Rate ECU vs. Calculated

'B1 Mountain Downhill'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019




EU 582/2011/Appendix I/3.2.1 | Fuel Rate ECU and calculated

y = 0.9934 x + 0.040 | R²=0.976 | SEE=0.027
m = 0.99 (0.9 - 1.1 recommended)
R² = 0.98 (min 0.9 mandatory)

Data from - to [% of Maximum]

0 100

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: Trip Summary

'A0 LATC>CARB'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019

| | | |
|---|---|---|
| Trip Duration | 1882.00 | s |
| Trip Duration (a) | 1882.00 | s |
| Trip Distance | 24.00 | mi |
| Trip Distance (a) | 24.00 | mi |
| | | |
| Trip Fuel Cons. (b) | 1.92 | kg |
| Trip Fuel Cons. (ab) | 1.92 | kg |
| Trip Fuel Cons. EU (ac) | 1.96 | kg |
| Trip Fuel Cons. US (ac) | 1.96 | kg |
| | | |
| Trip Fuel Economy (b) | 35.38 | mpg_US |
| Trip Fuel Economy (ab) | 35.38 | mpg_US |
| Trip Fuel Economy EU (ac) | 34.67 | mpg_US |
| Trip Fuel Economy US (ac) | 34.58 | mpg_US |
| Trip Fuel Economy GGE (b) | 35.38 | mpg_US |
| Trip Fuel Economy GGE (ab) | 35.38 | mpg_US |
| Trip Fuel Economy EU GGE (ac) | 34.67 | mpg_US |
| Trip Fuel Economy US GGE (ac) | 34.58 | mpg_US |
| | | |
| Trip Av. Eng. Speed | 1485.27 | rpm |
| Trip Av. Torque | 62.34 | lbft |
| Trip Av. Power | 19.74 | hp |
| Trip Work | | |
| Trip Work (a) | 10.32 | hphr |
| | | |
| Trip Exhaust Mass | 31.55 | kg |
| Trip Exhaust Mass EU (ac) | 30.50 | kg |
| Trip Exhaust Mass US (ac) | 30.45 | kg |
| | | |
| Trip Av. Amb. Temperature | 69.08 | deg_F |
| Trip Av. Humidity | 13.99 | % |
| Trip Av. GPS Altitude | 48.79 | m |
| | | |
| Fuel Type | Petrol (E10) | |

| | | |
|---|---|---|
| ave THC | 39.70281 | ppm |
| ave NMHC | 31.55637 | ppm |
| ave CH4 | 8.14644 | ppm |
| ave CO | 226.99792 | ppm |
| ave CO2 | 11.32745 | % |
| ave NOx | 10.48668 | ppm |
| ave PM | n/a | mg/m3 |
| ave Soot meas | n/a | mg/m3 |
| ave Soot | n/a | mg/m3 |
| ave PN | n/a | #/cm3 |
| | | |
| tot THC | 0.61882 | g |
| tot NMHC | 0.44779 | g |
| tot CH4 | 0.16358 | g |
| tot CO | 7.33928 | g |
| tot CO2 | 5952.34938 | g |
| tot NO (d) | 0.38170 | g |
| tot NO2 | 0.09956 | g |
| tot NOx | 0.48127 | g |
| tot Soot | n/a | g |
| tot Soot meas | n/a | g |
| tot PM | n/a | g |
| tot PN | n/a | # |
| | | |
| PM measurement type | 0.00000 | - |
| tot Soot on PM filter (estim.) | 0.00000 | mg |
| Soot --> PM simple scaling factor | 1.00000 | - |
| | | |
| Trip Av. Veh. Speed | 45.91466 | mi/hr |
| | | |
| Trip Distance Share Urban | 10.79969 | % distance |
| Trip Distance Share Rural | 7.19004 | % distance |
| Trip Distance Share Motorway | 82.01027 | % distance |

| | | |
|---|---|---|
| BS CO2 | 576.76188 | g/hphr |
| BS CO | 0.71115 | g/hphr |
| BS THC | 0.05996 | g/hphr |
| BS NMHC | 0.04339 | g/hphr |
| BS CH4 | 0.01585 | g/hphr |
| BS NO (d) | 0.03699 | g/hphr |
| BS NO2 | 0.00965 | g/hphr |
| BS NOx | 0.04663 | g/hphr |
| BS Soot | n/a | g/hphr |
| BS Soot meas | n/a | g/hphr |
| BS PM | n/a | g/hphr |
| BS PN | n/a | #/hpr |
| | | |
| DS CO2 | 247.98186 | g/mi |
| DS CO | 0.30576 | g/mi |
| DS THC | 0.02578 | g/mi |
| DS NMHC | 0.01866 | g/mi |
| DS CH4 | 0.00681 | g/mi |
| DS NO (d) | 0.01590 | g/mi |
| DS NO2 | 0.00415 | g/mi |
| DS NOx | 0.02005 | g/mi |
| DS Soot | n/a | g/mi |
| DS Soot meas | n/a | g/mi |
| DS PM | n/a | g/mi |
| DS PN | n/a | #/mi |
| | | |
| FS CO2 | 3100.71467 | g/kg |
| FS CO | 3.82320 | g/kg |
| FS THC | 0.32236 | g/kg |
| FS NMHC | 0.23327 | g/kg |
| FS CH4 | 0.08521 | g/kg |
| FS NO (d) | 0.19884 | g/kg |
| FS NO2 | 0.05186 | g/kg |
| FS NOx | 0.25070 | g/kg |
| FS Soot | n/a | g/kg |
| FS Soot meas | n/a | g/kg |
| FS PM | n/a | g/kg |
| FS PN | n/a | #/kg |

(a) GAS PEMS measurement state only, (b) based on fuel rate input (ECU, Fuel Meter), (c) Based on A/F ratio (eq 28-32 - R49)
(d) NO calculated using molecular weight of NO2, GGE=Gasoline Gallon Equivalents

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

# Case: W177-4577
# Page: Trip Summary Drift Corrected

'A0 LATC>CARB'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019

| | | |
|---|---|---|
| Trip Duration | 1882.00 | s |
| Trip Duration (a) | 1882.00 | s |
| Trip Distance | 24.00 | mi |
| Trip Distance (a) | 24.00 | mi |
| | | |
| Trip Fuel Cons. (b) | 1.92 | kg |
| Trip Fuel Cons. (ab) | 1.92 | kg |
| Trip Fuel Cons. EU (ac) | 1.96 | kg |
| Trip Fuel Cons. US (ac) | 1.96 | kg |
| | | |
| Trip Fuel Economy (b) | 35.38 | mpg_US |
| Trip Fuel Economy (ab) | 35.38 | mpg_US |
| Trip Fuel Economy EU (ac) | 34.67 | mpg_US |
| Trip Fuel Economy US (ac) | 34.58 | mpg_US |
| Trip Fuel Economy GGE (b) | 35.38 | mpg_US |
| Trip Fuel Economy GGE (ab) | 35.38 | mpg_US |
| Trip Fuel Economy EU GGE (ac) | 34.67 | mpg_US |
| Trip Fuel Economy US GGE (ac) | 34.58 | mpg_US |
| | | |
| Trip Av. Eng. Speed | 1485.27 | rpm |
| Trip Av. Torque | 62.34 | lbft |
| Trip Av. Power | 19.74 | hp |
| Trip Work | | |
| Trip Work (a) | 10.32 | hphr |
| | | |
| Trip Exhaust Mass | 31.55 | kg |
| Trip Exhaust Mass EU (ac) | 30.50 | kg |
| Trip Exhaust Mass US (ac) | 30.45 | kg |
| | | |
| Trip Av. Amb. Temperature | 69.08 | deg_F |
| Trip Av. Humidity | 13.99 | % |
| Trip Av. GPS Altitude | 48.79 | m |
| | | |
| Fuel Type | Petrol (E10) | |

| | | |
|---|---|---|
| ave THC DC | 39.88504 | ppm |
| ave NMHC DC | 31.46133 | ppm |
| ave CH4 DC | 8.42372 | ppm |
| ave CO DC | 221.79922 | ppm |
| ave CO2 DC | 11.35368 | % |
| ave NOx DC | 10.56340 | ppm |
| ave PM | n/a | mg/m3 |
| ave Soot meas | n/a | mg/m3 |
| ave Soot | n/a | mg/m3 |
| ave PN DC | | |
| | | |
| tot THC DC | 0.61988 | g |
| tot NMHC DC | 0.44655 | g |
| tot CH4 DC | 0.16578 | g |
| tot CO DC | 7.20559 | g |
| tot CO2 DC | 5966.12797 | g |
| tot NO DC (d) | 0.38098 | g |
| tot NO2 DC | 0.10300 | g |
| tot NOx DC | 0.48398 | g |
| tot Soot | n/a | g |
| tot Soot meas | n/a | g |
| tot PM | n/a | g |
| tot PN DC | | |
| | | |
| PM measurement type | 0.00000 | - |
| tot Soot on PM filter (estim.) | 0.00000 | mg |
| Soot --> PM simple scaling factor | 1.00000 | - |
| | | |
| Trip Av. Veh. Speed | 45.91466 | mi/hr |
| | | |
| Trip Distance Share Urban | 10.79969 | % distance |
| Trip Distance Share Rural | 7.19004 | % distance |
| Trip Distance Share Motorway | 82.01027 | % distance |

| | | |
|---|---|---|
| BS CO2 DC | 578.09698 | g/hphr |
| BS CO DC | 0.69820 | g/hphr |
| BS THC DC | 0.06006 | g/hphr |
| BS NMHC DC | 0.04327 | g/hphr |
| BS CH4 DC | 0.01606 | g/hphr |
| BS NO DC (d) | 0.03692 | g/hphr |
| BS NO2 DC | 0.00998 | g/hphr |
| BS NOx DC | 0.04690 | g/hphr |
| BS Soot | n/a | g/hphr |
| BS Soot meas | n/a | g/hphr |
| BS PM | n/a | g/hphr |
| BS PN DC | | |
| | | |
| DS CO2 DC | 248.55589 | g/mi |
| DS CO DC | 0.30019 | g/mi |
| DS THC DC | 0.02583 | g/mi |
| DS NMHC DC | 0.01860 | g/mi |
| DS CH4 DC | 0.00691 | g/mi |
| DS NO DC (d) | 0.01587 | g/mi |
| DS NO2 DC | 0.00429 | g/mi |
| DS NOx DC | 0.02016 | g/mi |
| DS Soot | n/a | g/mi |
| DS Soot meas | n/a | g/mi |
| DS PM | n/a | g/mi |
| DS PN DC | | |
| | | |
| FS CO2 DC | 3107.89225 | g/kg |
| FS CO DC | 3.75356 | g/kg |
| FS THC DC | 0.32291 | g/kg |
| FS NMHC DC | 0.23262 | g/kg |
| FS CH4 DC | 0.08636 | g/kg |
| FS NO DC (d) | 0.19846 | g/kg |
| FS NO2 DC | 0.05366 | g/kg |
| FS NOx DC | 0.25212 | g/kg |
| FS Soot | n/a | g/kg |
| FS Soot meas | n/a | g/kg |
| FS PM | n/a | g/kg |
| FS PN DC | | |

(a) GAS PEMS measurement state only, (b) based on fuel rate input (ECU, Fuel Meter), (c) Based on A/F ratio (eq 28-32 - R49)
(d) NO calculated using molecular weight of NO2, GGE=Gasoline Gallon Equivalents

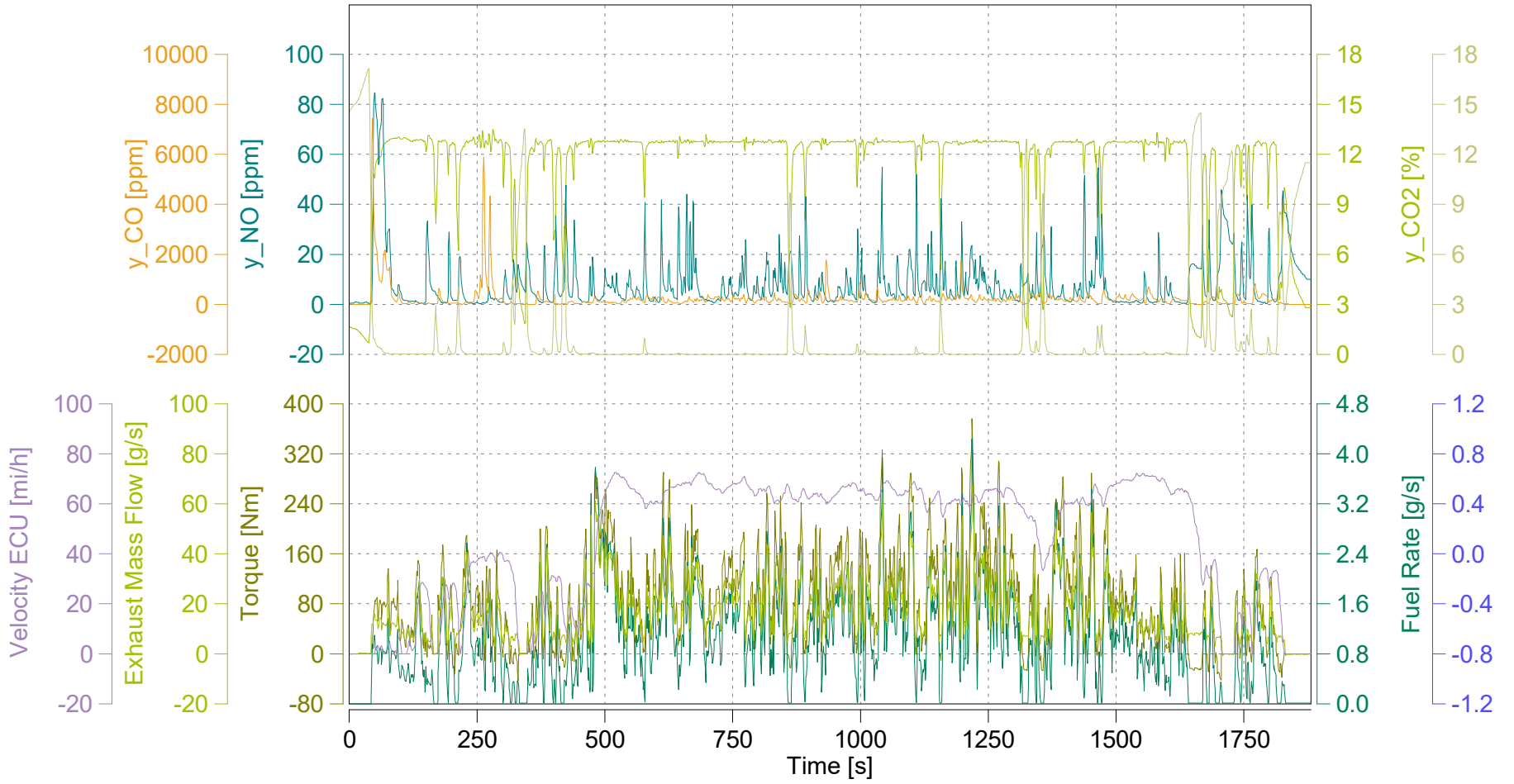
Case: W177-4577
Page: Time Alignment Check

'A0 LATC>CARB'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL

Concerto

Absolute Time




y_THC
y_NO
y_CO2
y_O2
c_Soot
Fuel Rate
Exhaust Mass
Torque
Velocity ECU

AVL 492 Defa

THC
NO/NO2
CO/CO2
O2

Apply Defa

Alignment Plo

Reset Time

Reset Al

Apply Curr

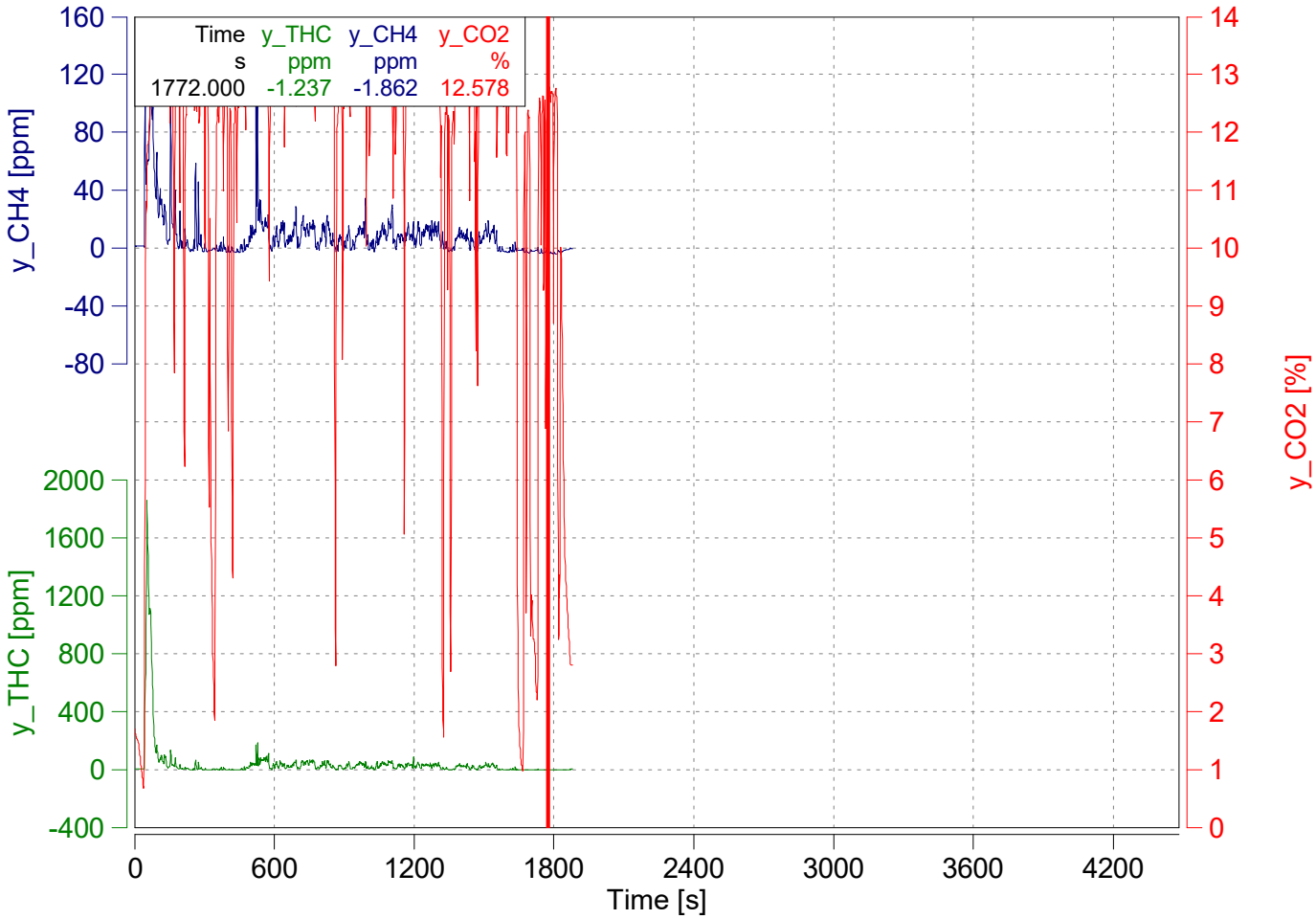
Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: Time Alignment of Gas Concentrations

'A0 LATC>CARB'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019




Absolute Time Shifts

| | | |
|---|---|---|
| y_THC | s | -5.2 |
| y_CH4 | s | -7.2 |

Reset Time Shifts in Plot

Apply Current Values

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

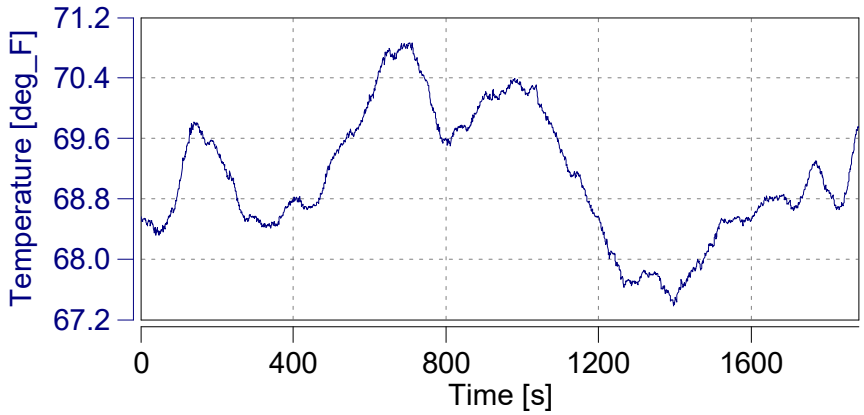
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

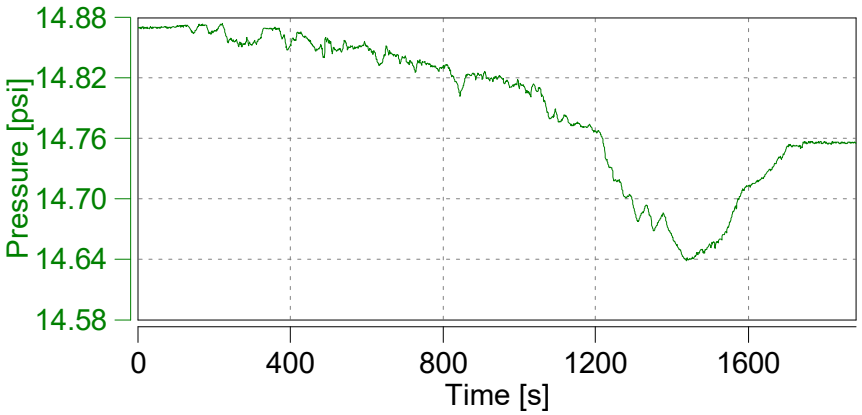
Case: W177-4577
Page: Ambient Conditions

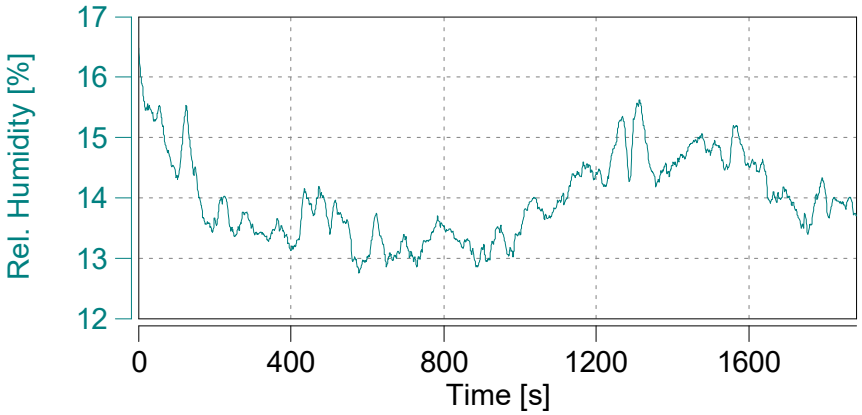
'A0 LATC>CARB'
Start Date: 02/18/2021
Start Time: 10:14:32.0

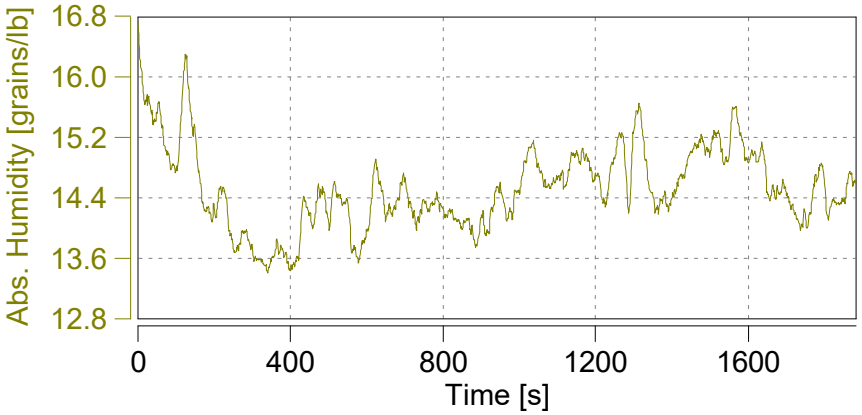
AVL

Concerto M.O.V.E, 2019



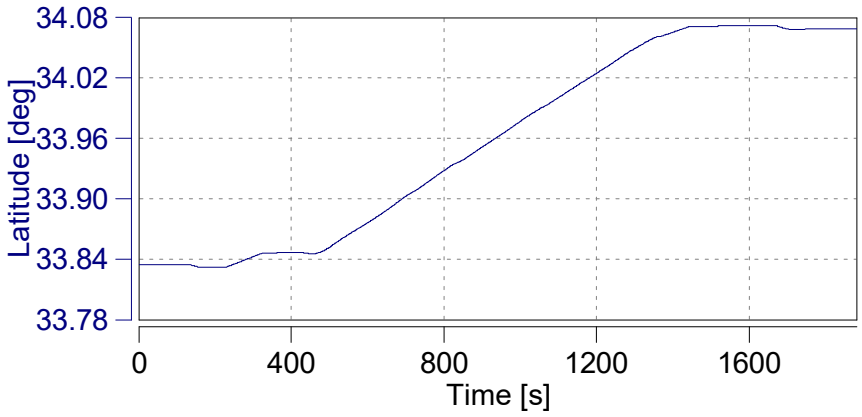

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

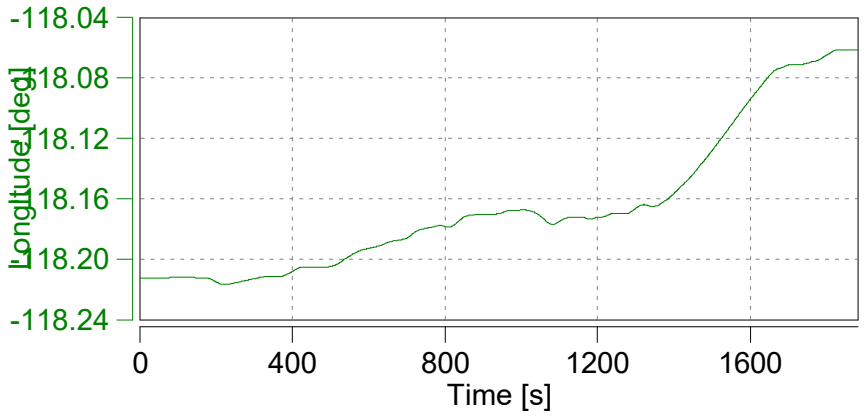
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

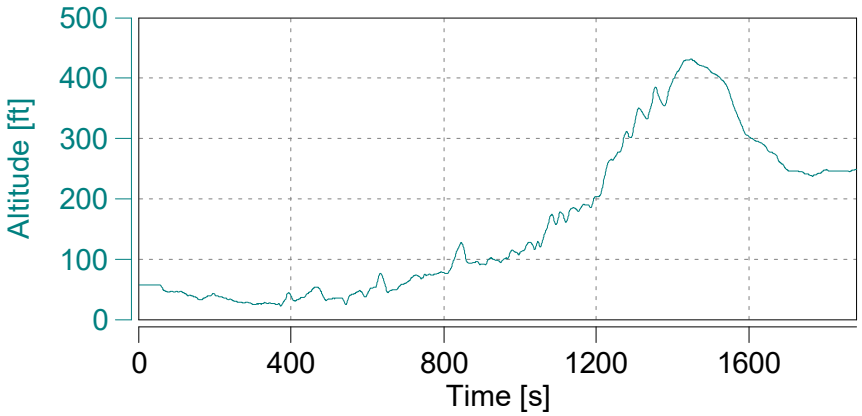
Case: W177-4577
Page: GPS

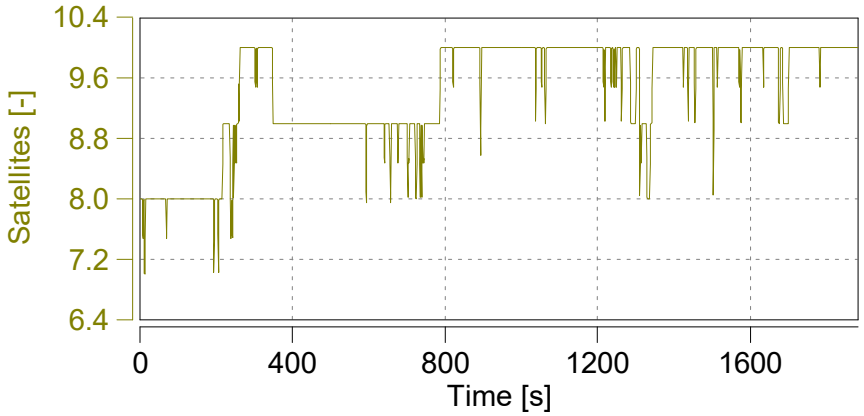
'A0 LATC>CARB'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019



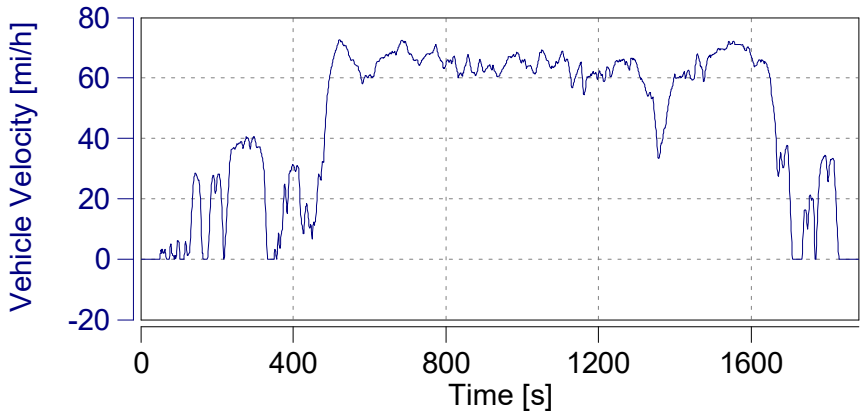

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

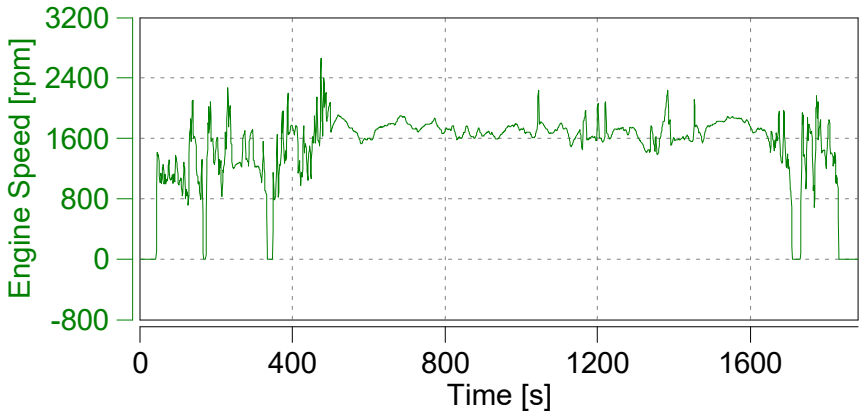
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

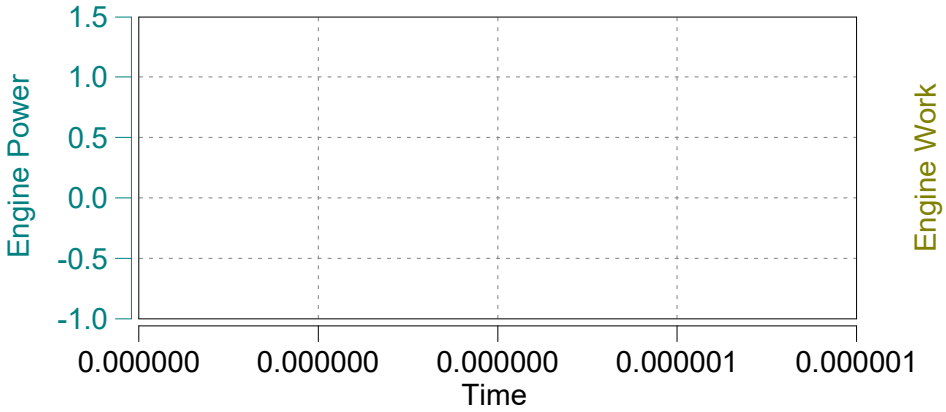
Case: W177-4577
Page: Engine (1)

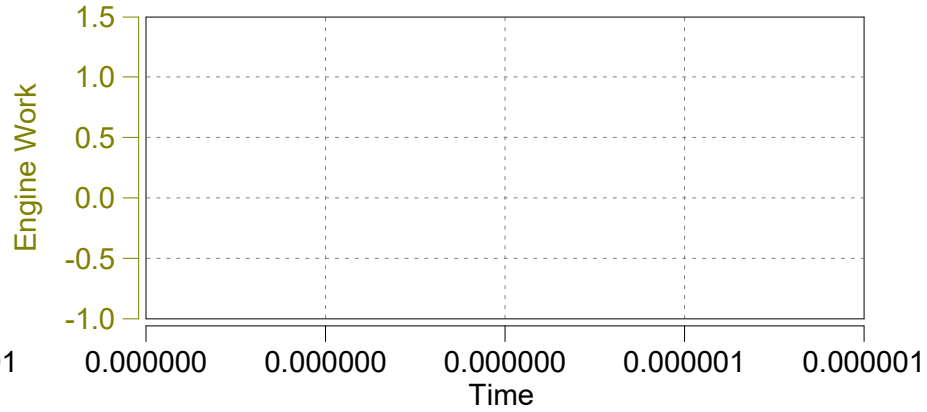
'A0 LATC>CARB'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019



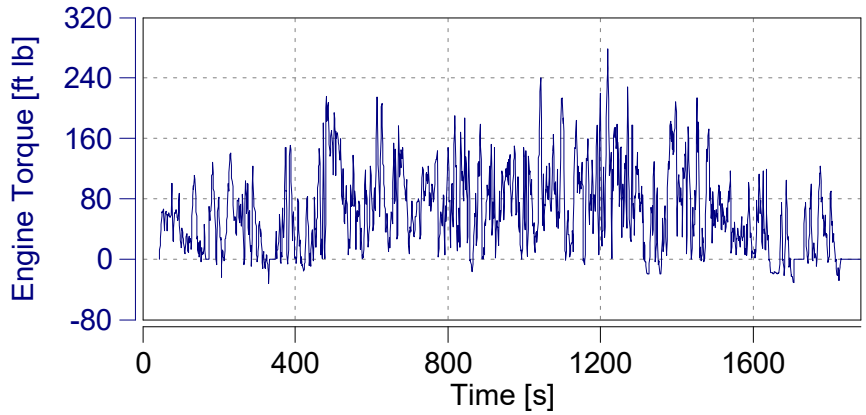

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

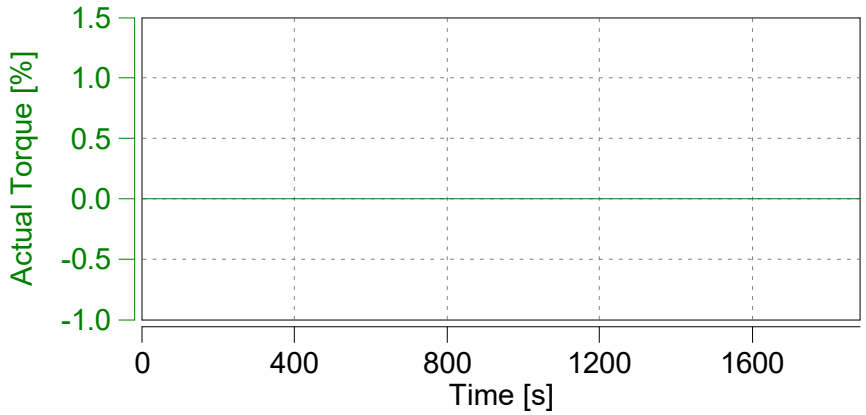
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

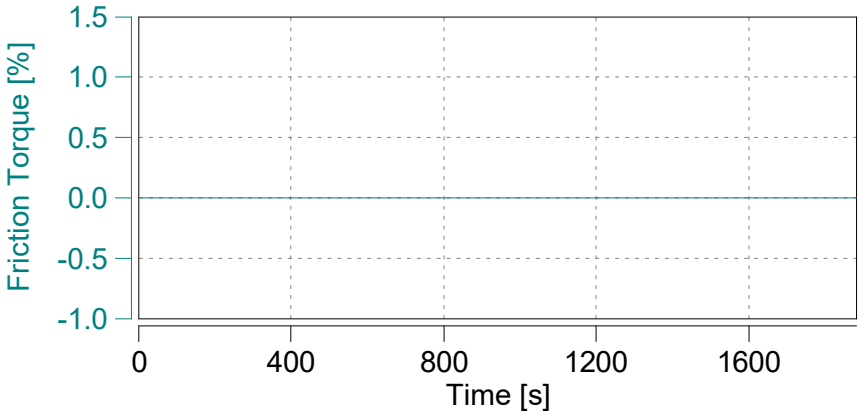
Case: W177-4577
Page: Engine (2)

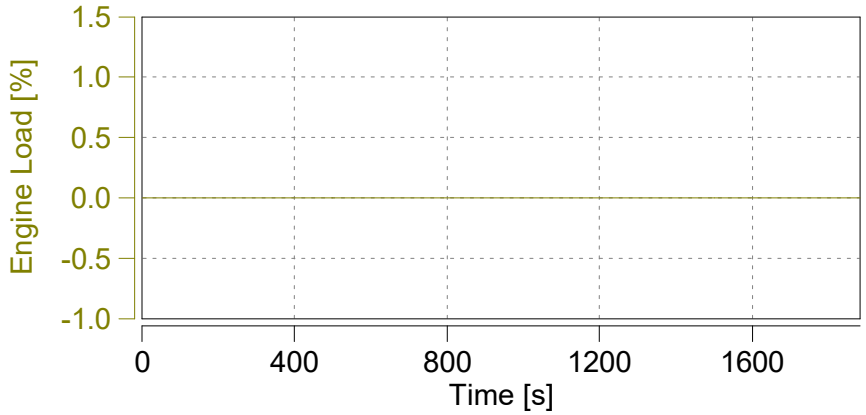
'A0 LATC>CARB'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019



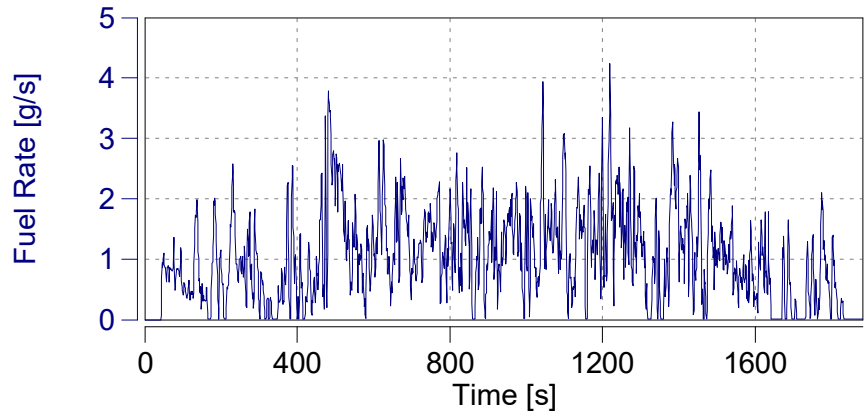

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

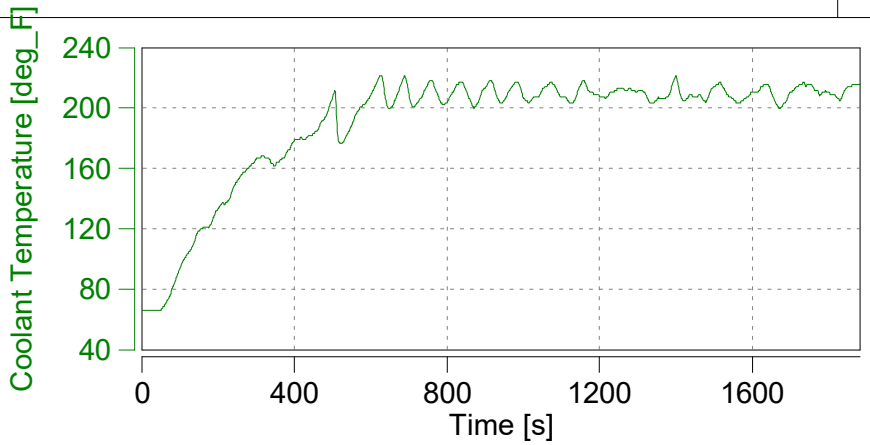
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

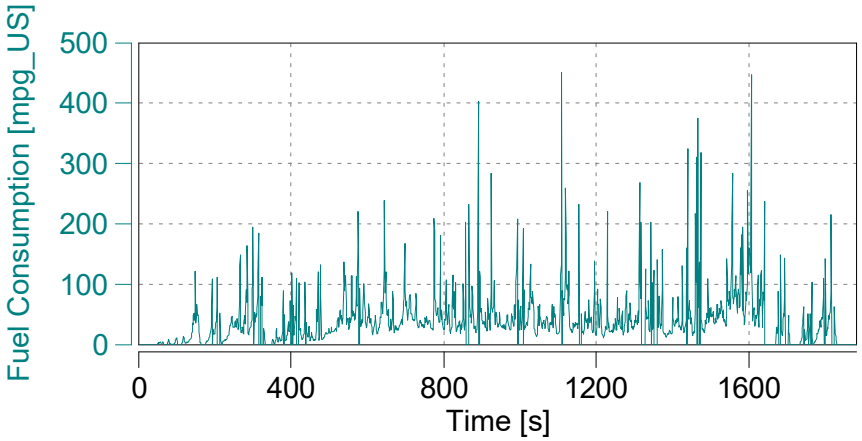
'A0 LATC>CARB'
Start Date: 02/18/2021
Start Time: 10:14:32.0

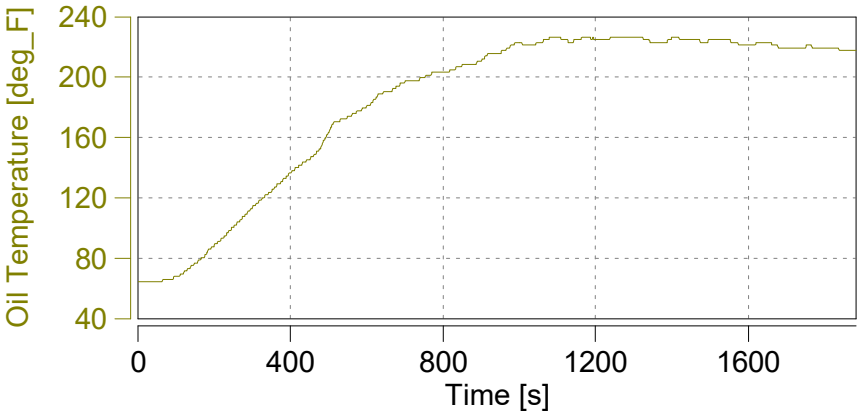
AVL

Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

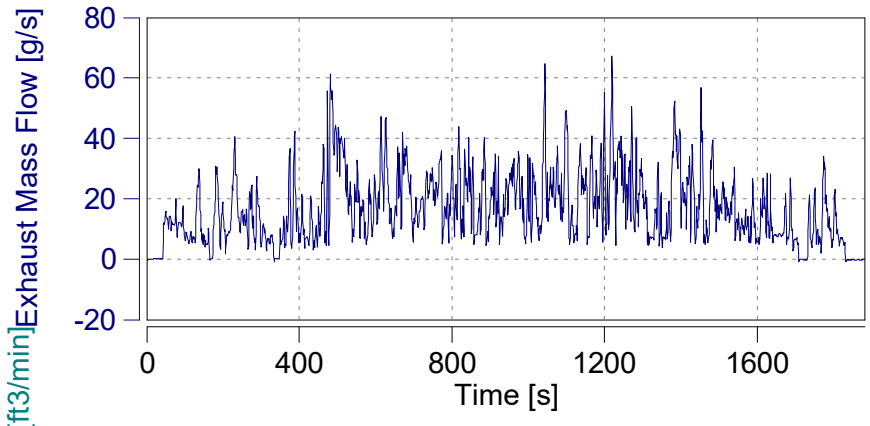
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

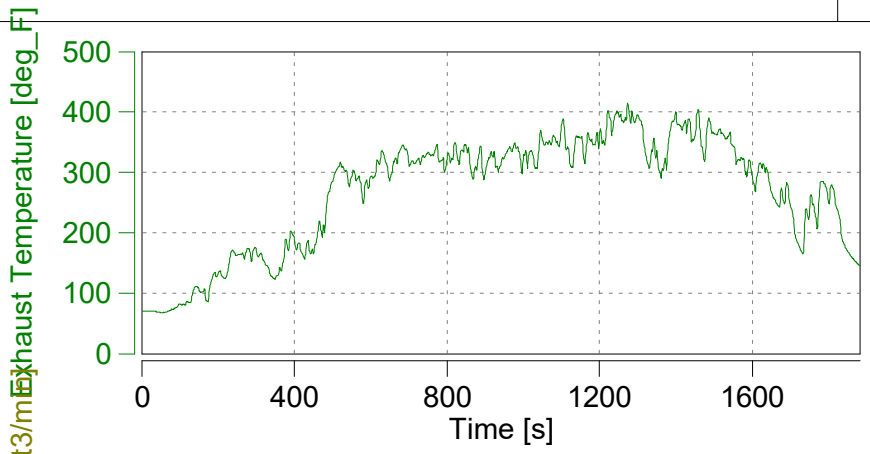
Case: W177-4577
Page: Exhaust Flow (1)

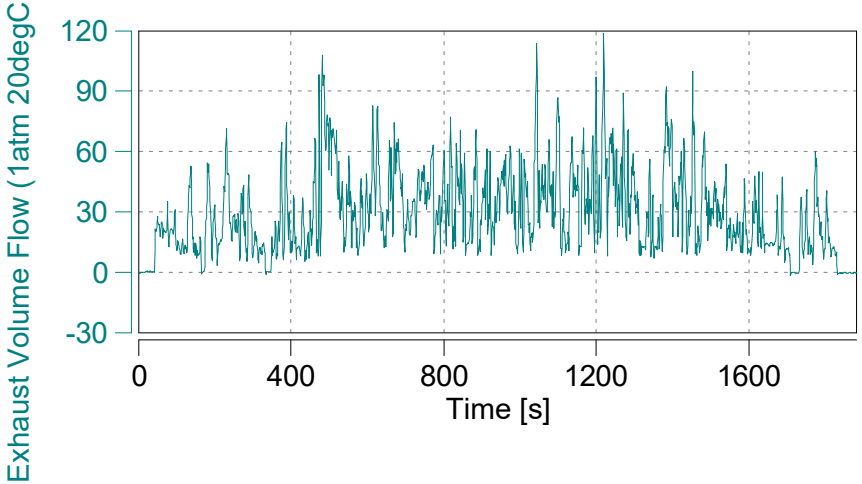
'A0 LATC>CARB'
Start Date: 02/18/2021
Start Time: 10:14:32.0

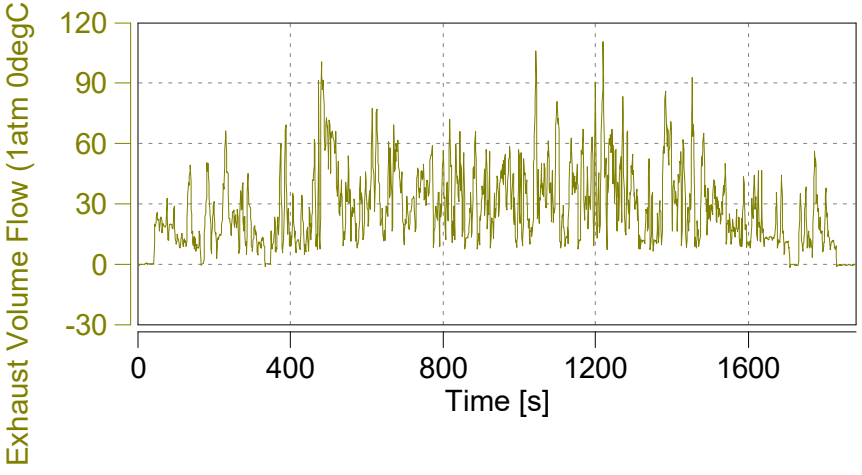
AVL

Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

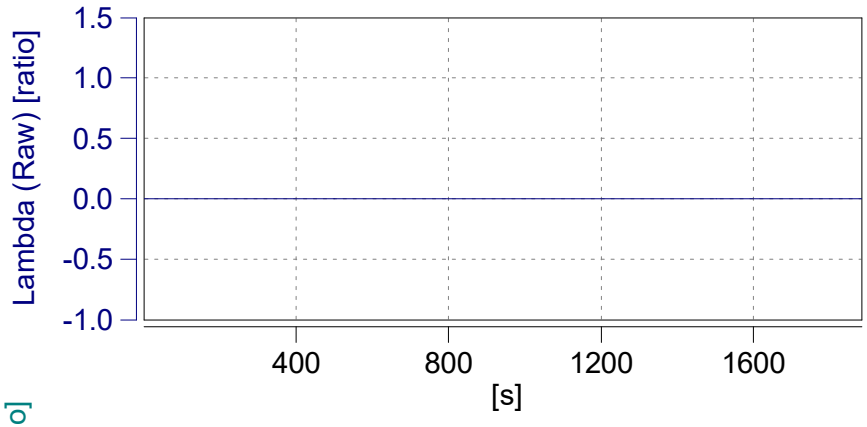
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

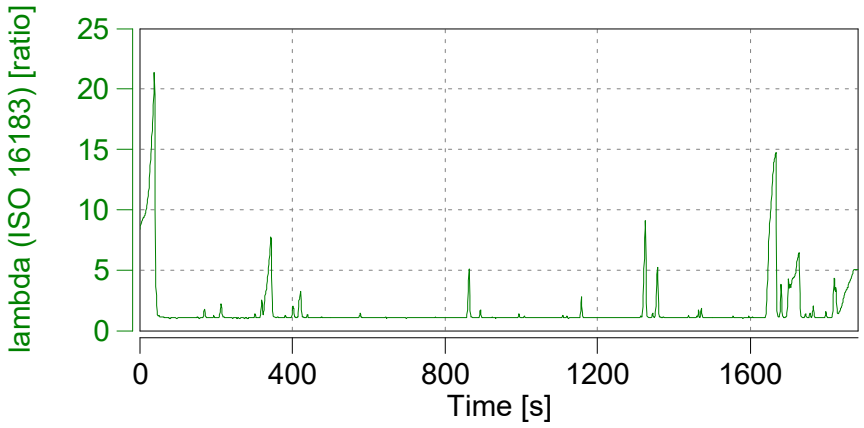
Case: W177-4577
Page: Exhaust Flow (2)

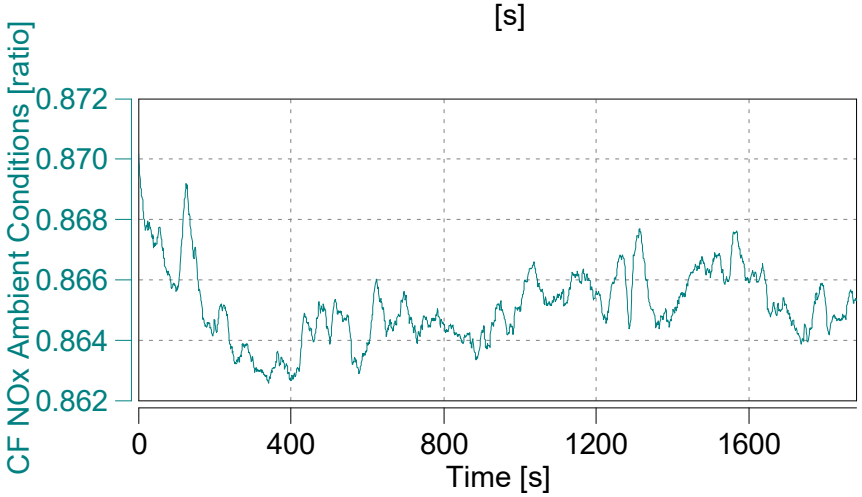
'A0 LATC>CARB'
Start Date: 02/18/2021
Start Time: 10:14:32.0

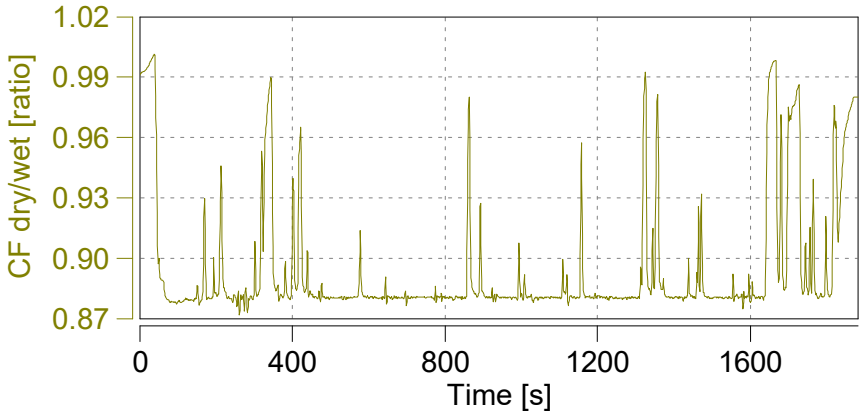
AVL

Concerto M.O.V.E, 2019



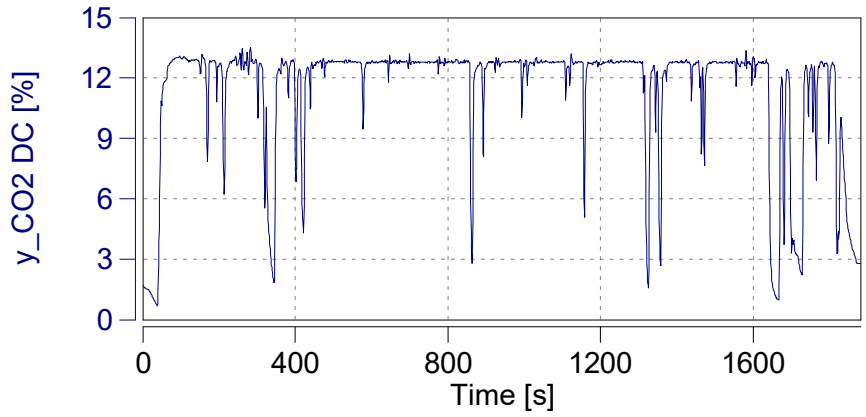

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

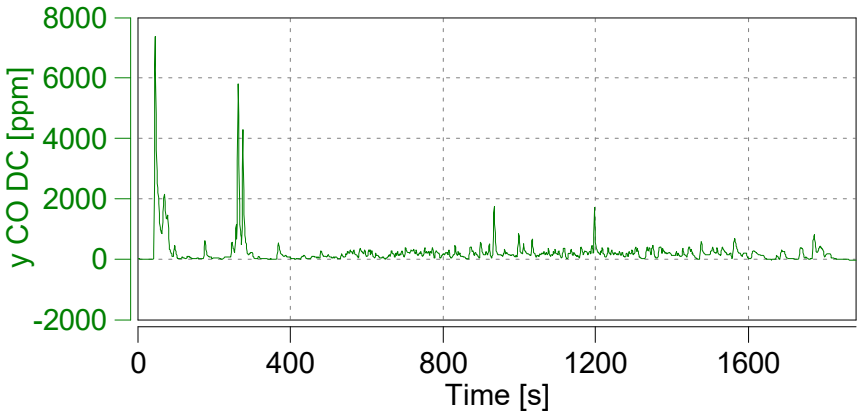
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

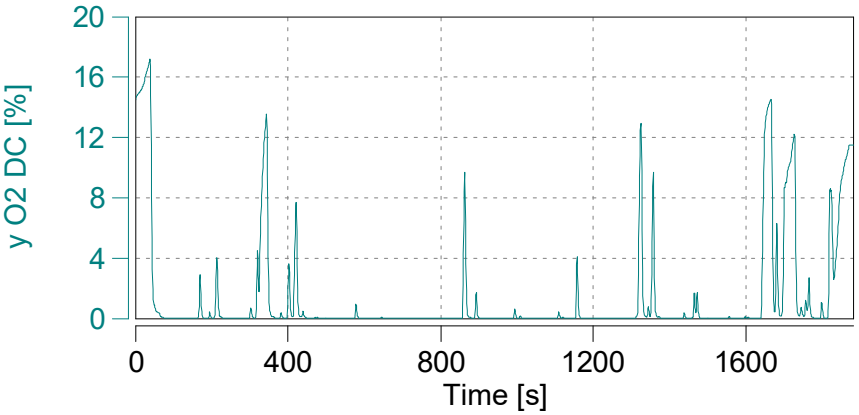
Case: W177-4577
Page: Corrected Emissions (1)

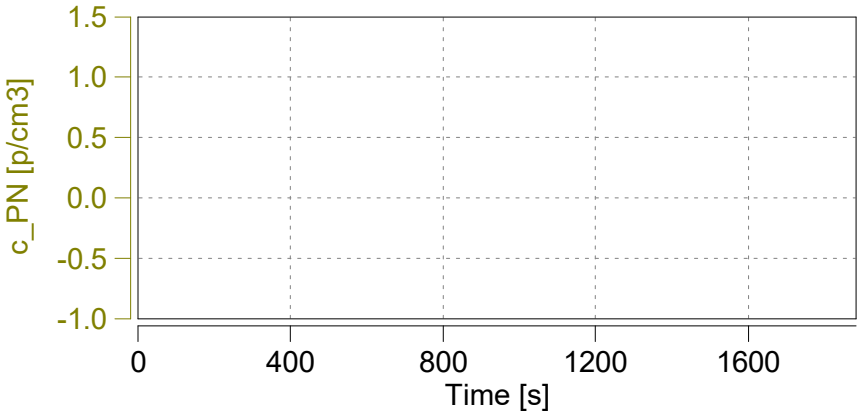
'A0 LATC>CARB'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019



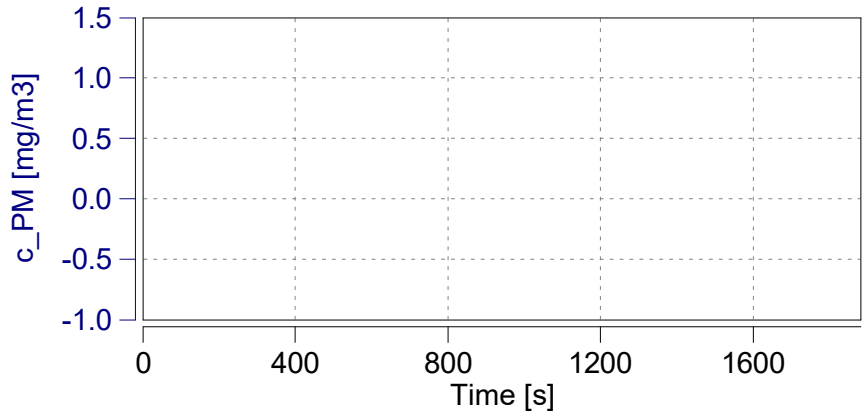

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

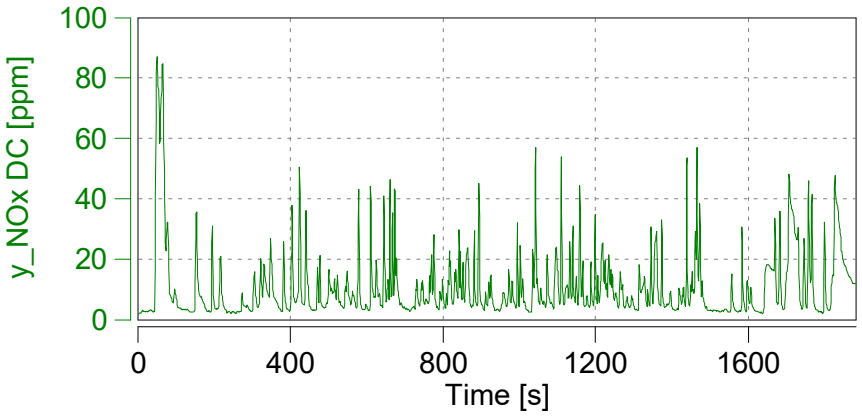
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

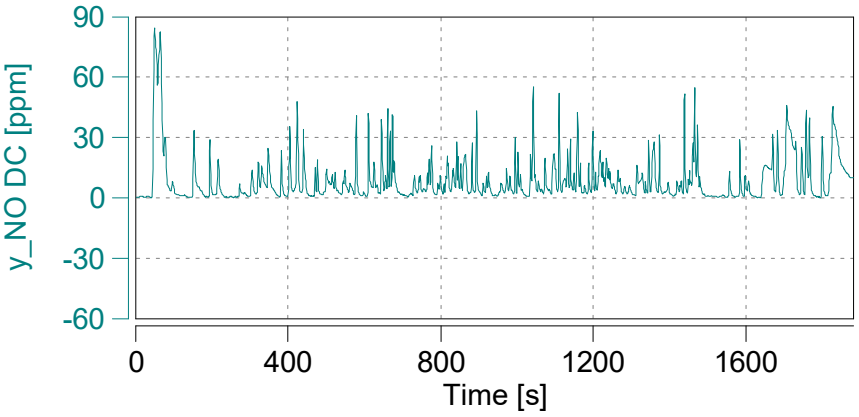
Case: W177-4577
Page: Corrected Emissions (2)

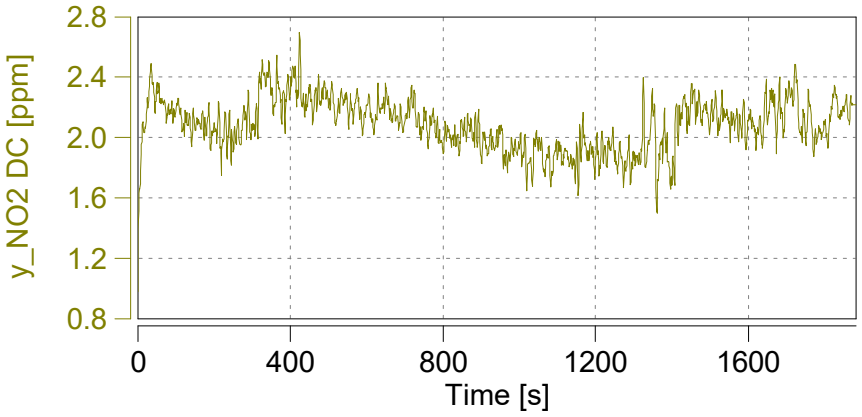
'A0 LATC>CARB'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019



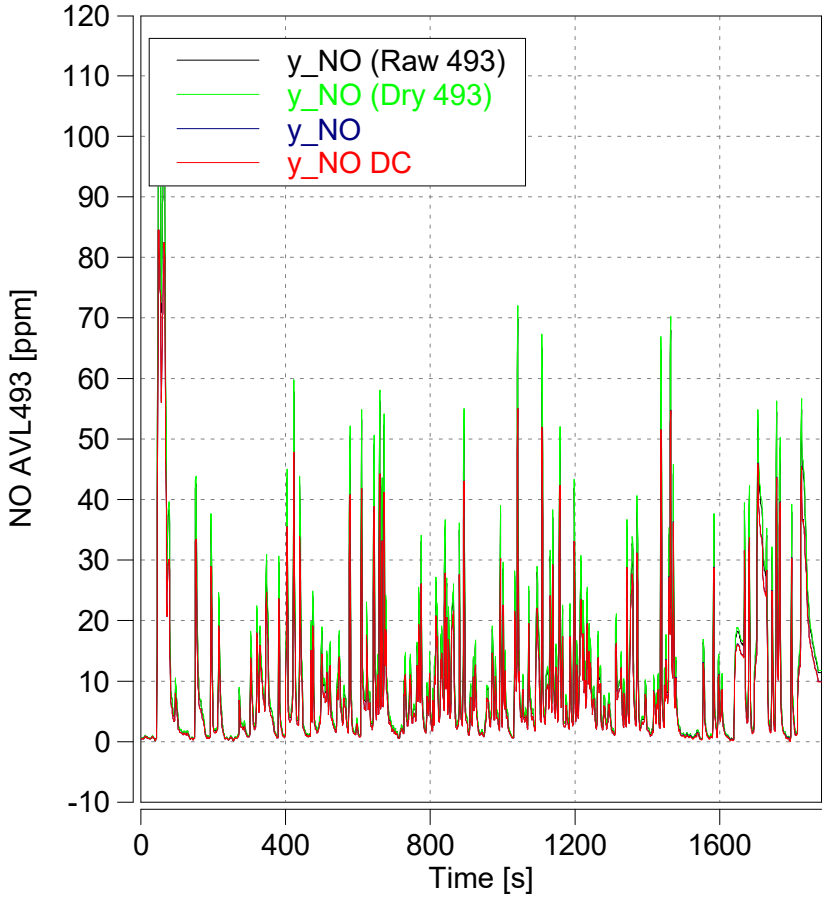

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

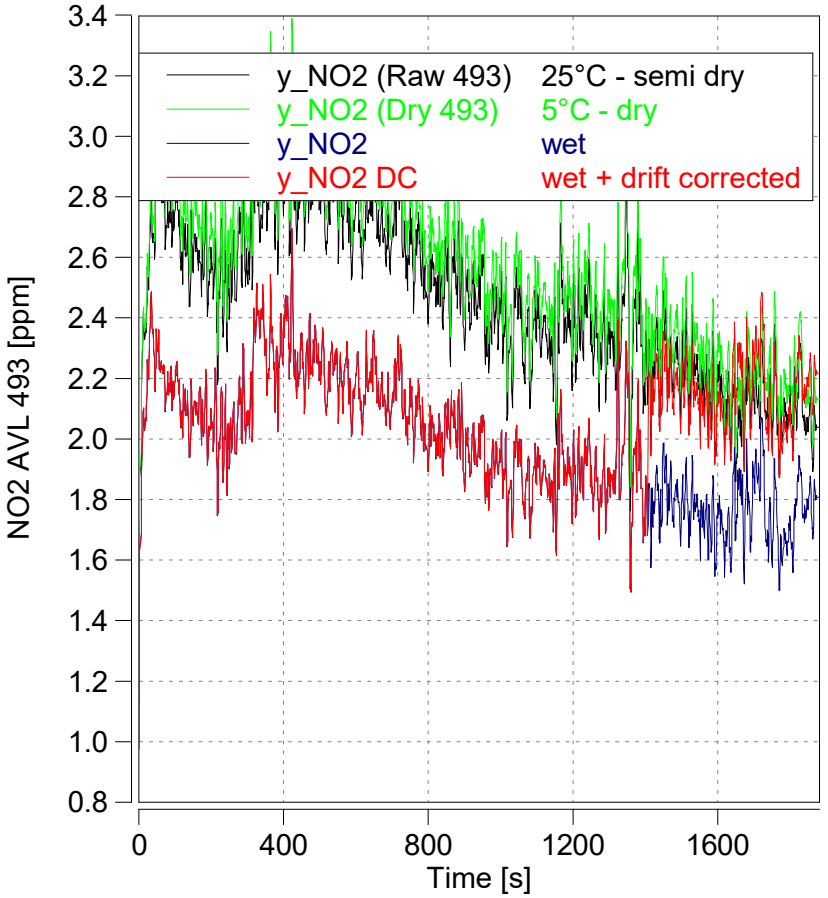
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: Corrected Emissions (3)

'A0 LATC>CARB'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019

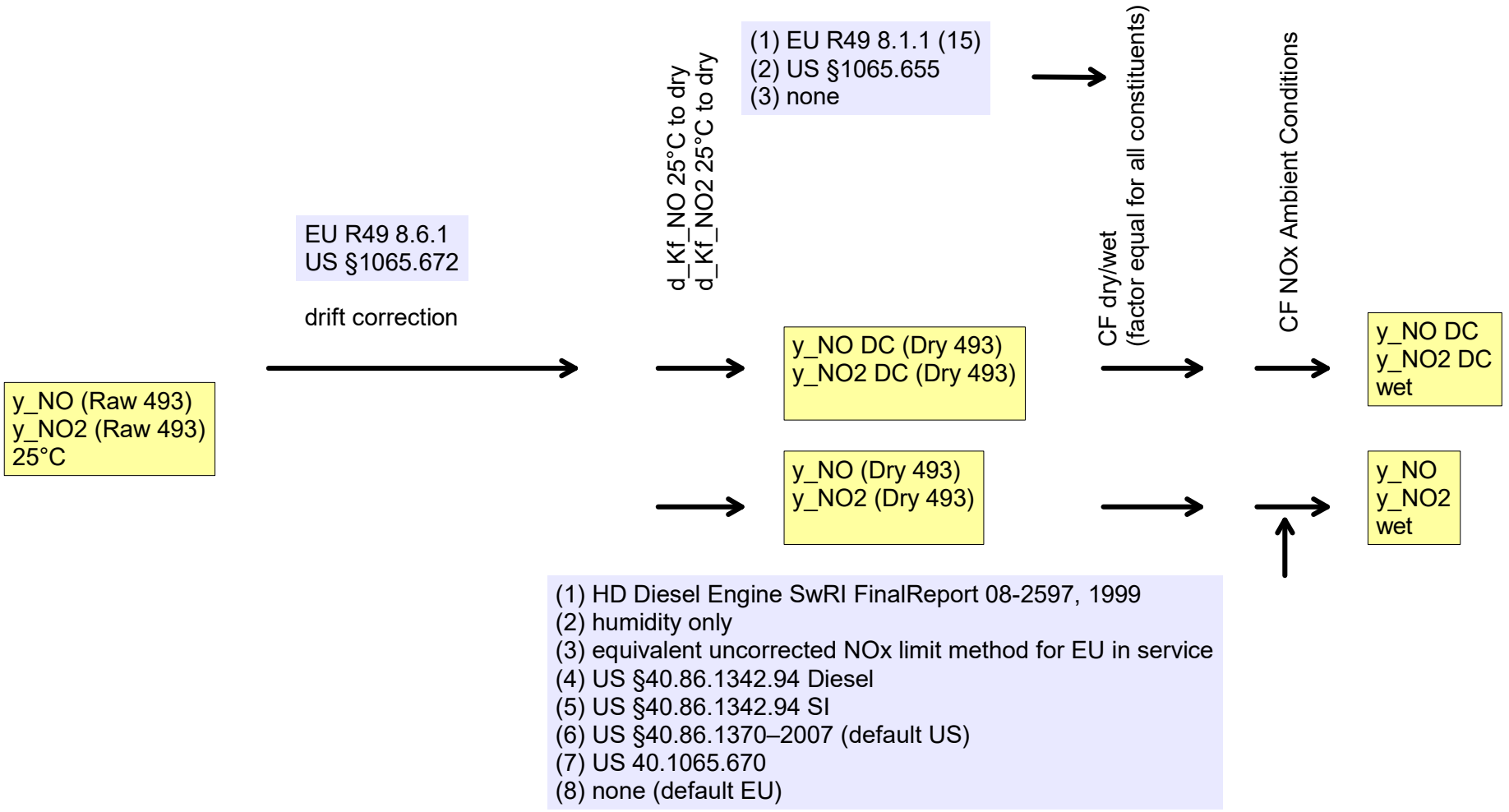


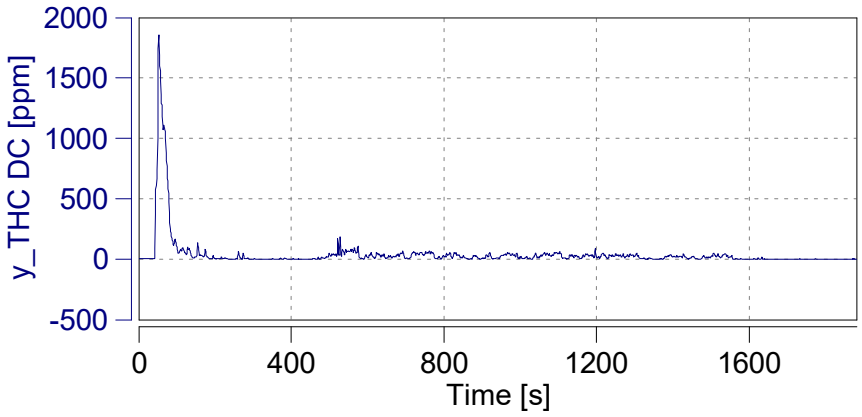



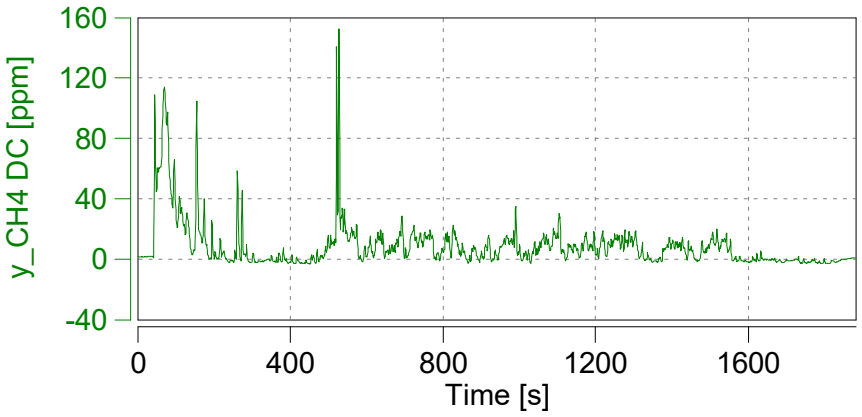

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

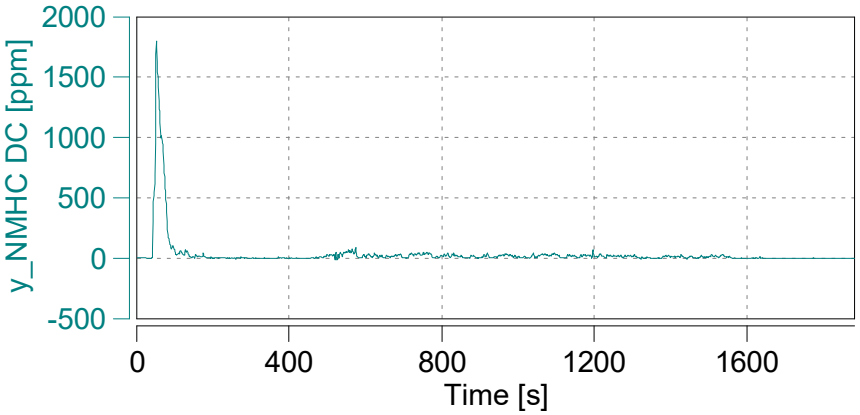
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

## NOx - AVL 493


y_NO (Raw 493)
y_NO2 (Raw 493)
25°C
EU R49 8.6.1
US §1065.672
drift correction
d_Kf_NO 25°C to dry
d_Kf_NO2 25°C to dry
(1) EU R49 8.1.1 (15)
(2) US §1065.655
(3) none
y_NO DC (Dry 493)
y_NO2 DC (Dry 493)
y_NO (Dry 493)
y_NO2 (Dry 493)
CF dry/wet
(factor equal for all constituents)
CF NOx Ambient Conditions
y_NO DC
y_NO2 DC
wet
y_NO
y_NO2
wet
(1) HD Diesel Engine SwRI FinalReport 08-2597, 1999
(2) humidity only
(3) equivalent uncorrected NOx limit method for EU in service
(4) US §40.86.1342.94 Diesel
(5) US §40.86.1342.94 SI
(6) US §40.86.1370–2007 (default US)
(7) US 40.1065.670
(8) none (default EU)


y_THC DC [ppm]
2000
1500
1000
500
0
-500
0
400
800
1200
1600
Time [s]

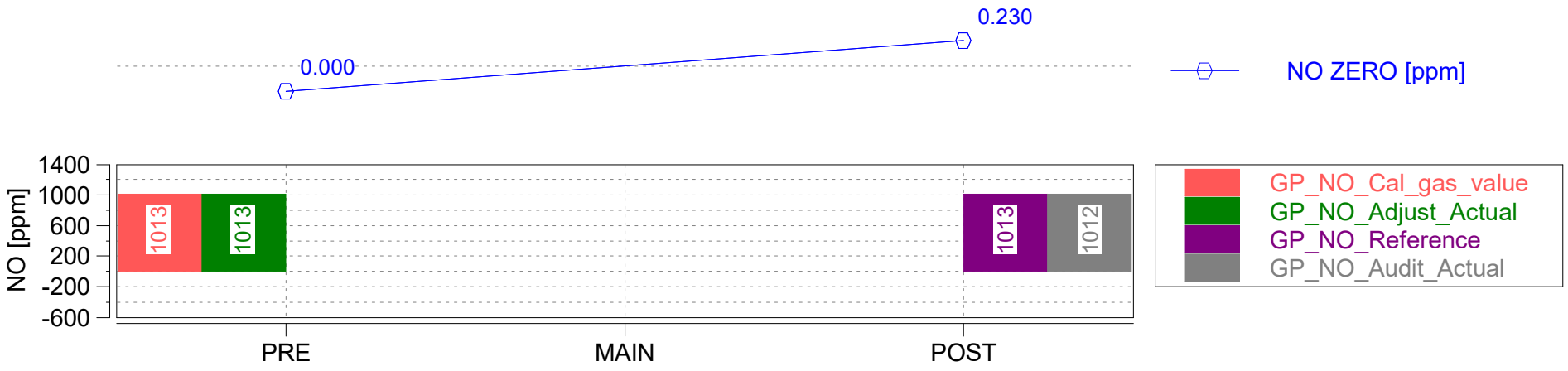

y_CH4 DC [ppm]
160
120
80
40
0
-40
0
400
800
1200
1600
Time [s]

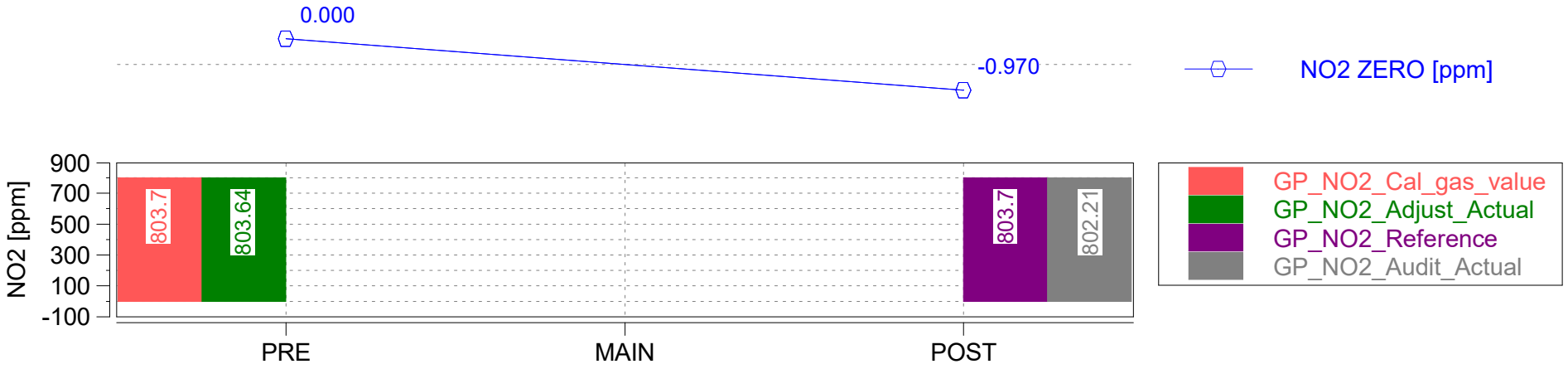

y_NMHC DC [ppm]
2000
1500
1000
500
0
-500
0
400
800
1200
1600
Time [s]

Case: W177-4577
Page: NO/NO2/NOx Zero - Span

'A0 LATC>CARB'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019



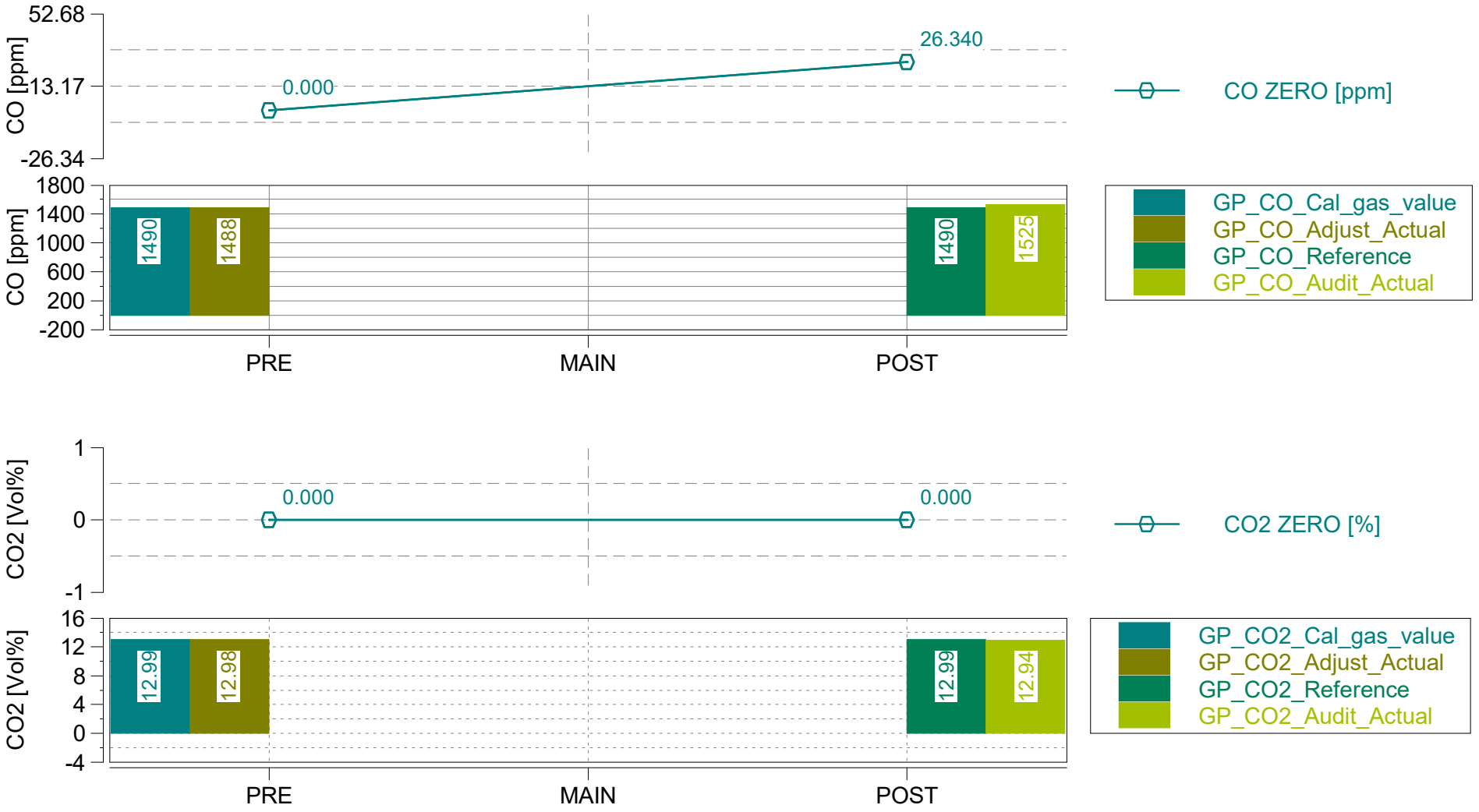

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: CO/CO2 Zero - Span

'A0 LATC>CARB'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019



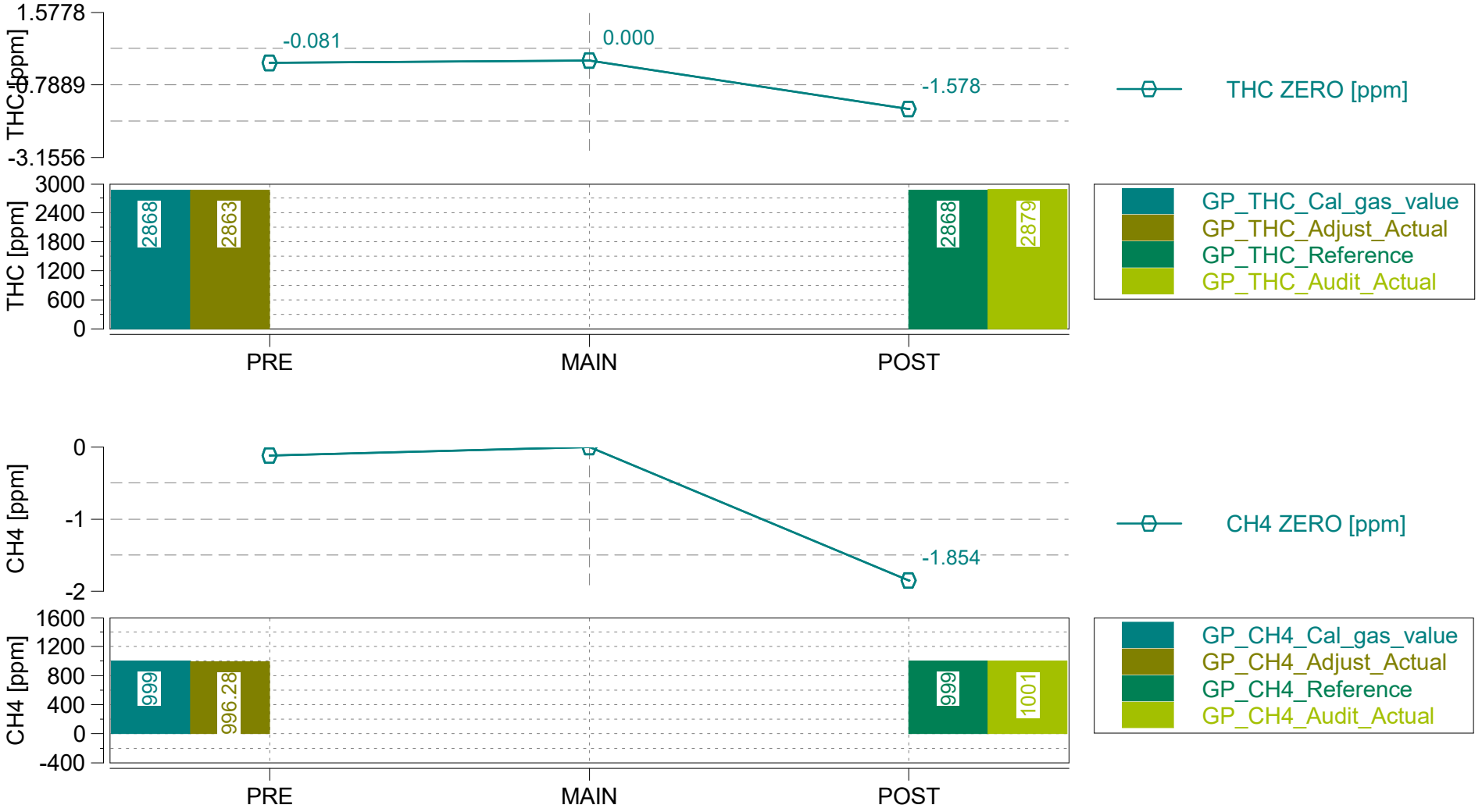

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: THC/CH4 Zero - Span

'A0 LATC>CARB'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

| § | criterium | condition | value | unit | pass/fail |
|---|---|---|---|---|---|
| **GAS Leak Check** | The leakage rate on the vacuum side shall not exceed 0.5 per cent of the in-use flow rate for the portion of the system being checked. | The leakage rate <= 0.5% | **0.30** | **%** | pass |
| **PN Leak Check** | n/a | n/a | **n/a** | **n/a** | n/a |
| **PM Leak Check** | n/a | n/a | **n/a** | **n/a** | n/a |

GAS PEMS Devices

| | |
|---|---|
| Device ID | AVL492 |
| Serial Number | 0246 |
| Firmware Version | V1.10 |
| Main Test Date | 2021-02-18 |
| Leak Check Age [days] | 0 |

| | |
|---|---|
| Device ID | AVL4925 |
| Serial Number | 145 |
| Firmware Version | 1.17.0.3 |

EFM

| | |
|---|---|
| Device ID | AVL495 |
| Serial Number | 00826 |
| Serial Number Tube | 01080 |
| Firmware Version | V1.10 |

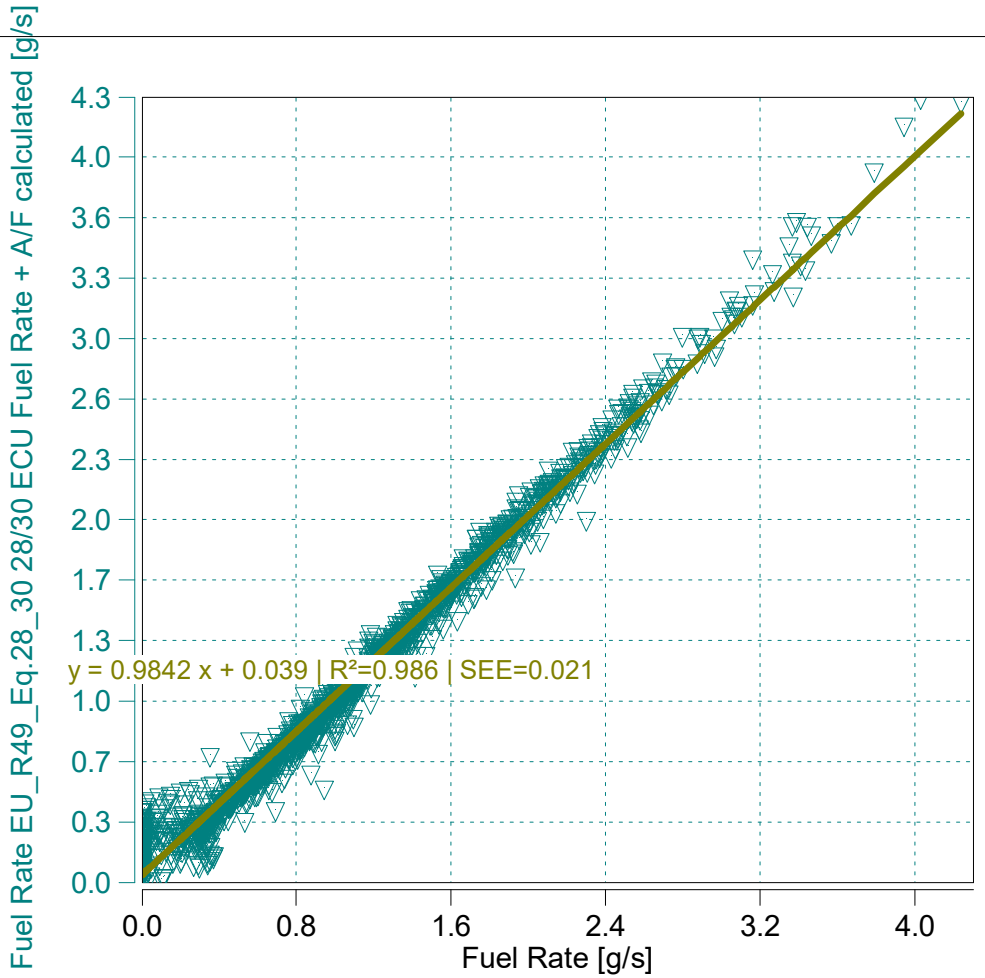
System Control

| | |
|---|---|
| SC Version | V2.6_212 |
| SC Serial Number | 60300923 |

Case: W177-4577
Page: Fuel Rate ECU vs. Calculated

'A0 LATC>CARB'
Start Date: 02/18/2021
Start Time: 10:14:32.0

AVL
Concerto M.O.V.E, 2019




EU 582/2011/Appendix I/3.2.1 | Fuel Rate ECU and calculated

y = 0.9842 x + 0.039 | R²=0.986 | SEE=0.021
m = 0.98 (0.9 - 1.1 recommended)
R² = 0.99 (min 0.9 mandatory)

Data from - to [% of Maximum]

0 100

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: Trip Summary

'LA City Route'
Start Date: 02/17/2021
Start Time: 10:17:10.0

AVL
Concerto M.O.V.E, 2019

| | | |
|---|---|---|
| Trip Duration | 3416.00 | s |
| Trip Duration (a) | 3416.00 | s |
| Trip Distance | 15.86 | mi |
| Trip Distance (a) | 15.86 | mi |
| | | |
| Trip Fuel Cons. (b) | 1.75 | kg |
| Trip Fuel Cons. (ab) | 1.75 | kg |
| Trip Fuel Cons. EU (ac) | 1.91 | kg |
| Trip Fuel Cons. US (ac) | 1.91 | kg |
| | | |
| Trip Fuel Economy (b) | 25.64 | mpg_US |
| Trip Fuel Economy (ab) | 25.64 | mpg_US |
| Trip Fuel Economy EU (ac) | 23.51 | mpg_US |
| Trip Fuel Economy US (ac) | 23.50 | mpg_US |
| Trip Fuel Economy GGE (b) | 25.64 | mpg_US |
| Trip Fuel Economy GGE (ab) | 25.64 | mpg_US |
| Trip Fuel Economy EU GGE (ac) | 23.51 | mpg_US |
| Trip Fuel Economy US GGE (ac) | 23.50 | mpg_US |
| | | |
| Trip Av. Eng. Speed | 1092.84 | rpm |
| Trip Av. Torque | 27.13 | lbft |
| Trip Av. Power | 8.72 | hp |
| Trip Work | | |
| Trip Work (a) | 8.27 | hphr |
| | | |
| Trip Exhaust Mass | 32.56 | kg |
| Trip Exhaust Mass EU (ac) | 29.02 | kg |
| Trip Exhaust Mass US (ac) | 29.11 | kg |
| | | |
| Trip Av. Amb. Temperature | 72.35 | deg_F |
| Trip Av. Humidity | 20.89 | % |
| Trip Av. GPS Altitude | 69.70 | m |
| | | |
| Fuel Type | Petrol (E10) | |

| | | |
|---|---|---|
| ave THC | -0.85246 | ppm |
| ave NMHC | 1.12118 | ppm |
| ave CH4 | -1.97365 | ppm |
| ave CO | 122.31517 | ppm |
| ave CO2 | 9.53368 | % |
| ave NOx | 13.37171 | ppm |
| ave PM | n/a | mg/m3 |
| ave Soot meas | n/a | mg/m3 |
| ave Soot | n/a | mg/m3 |
| ave PN | n/a | #/cm3 |
| | | |
| tot THC | 0.01721 | g |
| tot NMHC | 0.02394 | g |
| tot CH4 | 0.00657 | g |
| tot CO | 6.13146 | g |
| tot CO2 | 5798.63724 | g |
| tot NO (d) | 0.32923 | g |
| tot NO2 | 0.04940 | g |
| tot NOx | 0.37862 | g |
| tot Soot | n/a | g |
| tot Soot meas | n/a | g |
| tot PM | n/a | g |
| tot PN | n/a | # |
| | | |
| PM measurement type | 0.00000 | - |
| tot Soot on PM filter (estim.) | 0.00000 | mg |
| Soot --> PM simple scaling factor | 1.00000 | - |
| | | |
| Trip Av. Veh. Speed | 16.71007 | mi/hr |
| | | |
| Trip Distance Share Urban | 79.07440 | % distance |
| Trip Distance Share Rural | 17.98585 | % distance |
| Trip Distance Share Motorway | 2.93975 | % distance |

| | | |
|---|---|---|
| BS CO2 | 701.13545 | g/hphr |
| BS CO | 0.74138 | g/hphr |
| BS THC | 0.00208 | g/hphr |
| BS NMHC | 0.00290 | g/hphr |
| BS CH4 | 0.00079 | g/hphr |
| BS NO (d) | 0.03981 | g/hphr |
| BS NO2 | 0.00597 | g/hphr |
| BS NOx | 0.04578 | g/hphr |
| BS Soot | n/a | g/hphr |
| BS Soot meas | n/a | g/hphr |
| BS PM | n/a | g/hphr |
| BS PN | n/a | #/hpr |
| | | |
| DS CO2 | 365.70619 | g/mi |
| DS CO | 0.38670 | g/mi |
| DS THC | 0.00109 | g/mi |
| DS NMHC | 0.00151 | g/mi |
| DS CH4 | 0.00041 | g/mi |
| DS NO (d) | 0.02076 | g/mi |
| DS NO2 | 0.00312 | g/mi |
| DS NOx | 0.02388 | g/mi |
| DS Soot | n/a | g/mi |
| DS Soot meas | n/a | g/mi |
| DS PM | n/a | g/mi |
| DS PN | n/a | #/mi |
| | | |
| FS CO2 | 3313.27757 | g/kg |
| FS CO | 3.50345 | g/kg |
| FS THC | 0.00983 | g/kg |
| FS NMHC | 0.01368 | g/kg |
| FS CH4 | 0.00376 | g/kg |
| FS NO (d) | 0.18812 | g/kg |
| FS NO2 | 0.02823 | g/kg |
| FS NOx | 0.21634 | g/kg |
| FS Soot | n/a | g/kg |
| FS Soot meas | n/a | g/kg |
| FS PM | n/a | g/kg |
| FS PN | n/a | #/kg |

(a) GAS PEMS measurement state only, (b) based on fuel rate input (ECU, Fuel Meter), (c) Based on A/F ratio (eq 28-32 - R49)
(d) NO calculated using molecular weight of NO2, GGE=Gasoline Gallon Equivalents

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

# Case: W177-4577
# Page: Trip Summary Drift Corrected

'LA City Route'
Start Date: 02/17/2021
Start Time: 10:17:10.0

AVL
Concerto M.O.V.E, 2019

| | | |
|---|---|---|
| Trip Duration | 3416.00 | s |
| Trip Duration (a) | 3416.00 | s |
| Trip Distance | 15.86 | mi |
| Trip Distance (a) | 15.86 | mi |
| | | |
| Trip Fuel Cons. (b) | 1.75 | kg |
| Trip Fuel Cons. (ab) | 1.75 | kg |
| Trip Fuel Cons. EU (ac) | 1.91 | kg |
| Trip Fuel Cons. US (ac) | 1.91 | kg |
| | | |
| Trip Fuel Economy (b) | 25.64 | mpg_US |
| Trip Fuel Economy (ab) | 25.64 | mpg_US |
| Trip Fuel Economy EU (ac) | 23.51 | mpg_US |
| Trip Fuel Economy US (ac) | 23.50 | mpg_US |
| Trip Fuel Economy GGE (b) | 25.64 | mpg_US |
| Trip Fuel Economy GGE (ab) | 25.64 | mpg_US |
| Trip Fuel Economy EU GGE (ac) | 23.51 | mpg_US |
| Trip Fuel Economy US GGE (ac) | 23.50 | mpg_US |
| | | |
| Trip Av. Eng. Speed | 1092.84 | rpm |
| Trip Av. Torque | 27.13 | lbft |
| Trip Av. Power | 8.72 | hp |
| Trip Work | | |
| Trip Work (a) | 8.27 | hphr |
| | | |
| Trip Exhaust Mass | 32.56 | kg |
| Trip Exhaust Mass EU (ac) | 29.02 | kg |
| Trip Exhaust Mass US (ac) | 29.11 | kg |
| | | |
| Trip Av. Amb. Temperature | 72.35 | deg_F |
| Trip Av. Humidity | 20.89 | % |
| Trip Av. GPS Altitude | 69.70 | m |
| | | |
| Fuel Type | Petrol (E10) | |

| | | |
|---|---|---|
| ave THC DC | -0.81287 | ppm |
| ave NMHC DC | 1.10570 | ppm |
| ave CH4 DC | -1.91857 | ppm |
| ave CO DC | 122.69190 | ppm |
| ave CO2 DC | 9.54470 | % |
| ave NOx DC | 13.37234 | ppm |
| ave PM | n/a | mg/m3 |
| ave Soot meas | n/a | mg/m3 |
| ave Soot | n/a | mg/m3 |
| ave PN DC | | |
| | | |
| tot THC DC | 0.01742 | g |
| tot NMHC DC | 0.02371 | g |
| tot CH4 DC | 0.00678 | g |
| tot CO DC | 6.15034 | g |
| tot CO2 DC | 5805.34086 | g |
| tot NO DC (d) | 0.32923 | g |
| tot NO2 DC | 0.04943 | g |
| tot NOx DC | 0.37865 | g |
| tot Soot | n/a | g |
| tot Soot meas | n/a | g |
| tot PM | n/a | g |
| tot PN DC | | |
| | | |
| PM measurement type | 0.00000 | - |
| tot Soot on PM filter (estim.) | 0.00000 | mg |
| Soot --> PM simple scaling factor | 1.00000 | - |
| | | |
| Trip Av. Veh. Speed | 16.71007 | mi/hr |
| | | |
| Trip Distance Share Urban | 79.07440 | % distance |
| Trip Distance Share Rural | 17.98585 | % distance |
| Trip Distance Share Motorway | 2.93975 | % distance |

| | | |
|---|---|---|
| BS CO2 DC | 701.94601 | g/hphr |
| BS CO DC | 0.74366 | g/hphr |
| BS THC DC | 0.00211 | g/hphr |
| BS NMHC DC | 0.00287 | g/hphr |
| BS CH4 DC | 0.00082 | g/hphr |
| BS NO DC (d) | 0.03981 | g/hphr |
| BS NO2 DC | 0.00598 | g/hphr |
| BS NOx DC | 0.04578 | g/hphr |
| BS Soot | n/a | g/hphr |
| BS Soot meas | n/a | g/hphr |
| BS PM | n/a | g/hphr |
| BS PN DC | | |
| | | |
| DS CO2 DC | 366.12897 | g/mi |
| DS CO DC | 0.38789 | g/mi |
| DS THC DC | 0.00110 | g/mi |
| DS NMHC DC | 0.00150 | g/mi |
| DS CH4 DC | 0.00043 | g/mi |
| DS NO DC (d) | 0.02076 | g/mi |
| DS NO2 DC | 0.00312 | g/mi |
| DS NOx DC | 0.02388 | g/mi |
| DS Soot | n/a | g/mi |
| DS Soot meas | n/a | g/mi |
| DS PM | n/a | g/mi |
| DS PN DC | | |
| | | |
| FS CO2 DC | 3317.10795 | g/kg |
| FS CO DC | 3.51424 | g/kg |
| FS THC DC | 0.00996 | g/kg |
| FS NMHC DC | 0.01355 | g/kg |
| FS CH4 DC | 0.00387 | g/kg |
| FS NO DC (d) | 0.18812 | g/kg |
| FS NO2 DC | 0.02824 | g/kg |
| FS NOx DC | 0.21635 | g/kg |
| FS Soot | n/a | g/kg |
| FS Soot meas | n/a | g/kg |
| FS PM | n/a | g/kg |
| FS PN DC | | |

(a) GAS PEMS measurement state only, (b) based on fuel rate input (ECU, Fuel Meter), (c) Based on A/F ratio (eq 28-32 - R49)
(d) NO calculated using molecular weight of NO2, GGE=Gasoline Gallon Equivalents

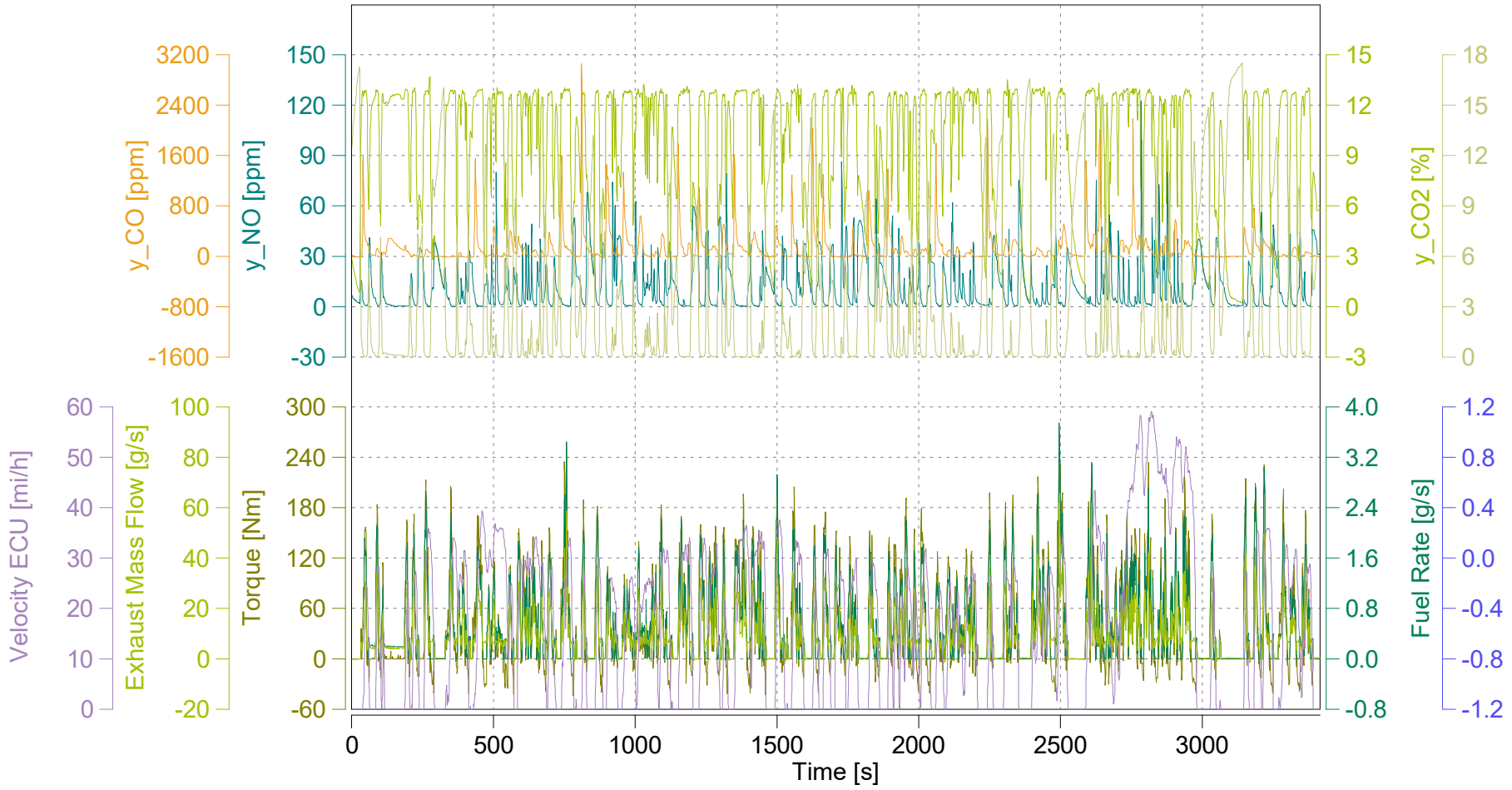
Case: W177-4577
Page: Time Alignment Check

'LA City Route'
Start Date: 02/17/2021
Start Time: 10:17:10.0

AVL
Concerto

Absolute Time

y_THC
y_NO
y_CO2
y_O2
c_Soot
Fuel Rate
Exhaust Mass
Torque
Velocity ECU




AVL 492 Defa

THC
NO/NO2
CO/CO2
O2

Apply Defa

Alignment Plo

Reset Time
Reset Al
Apply Curr

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

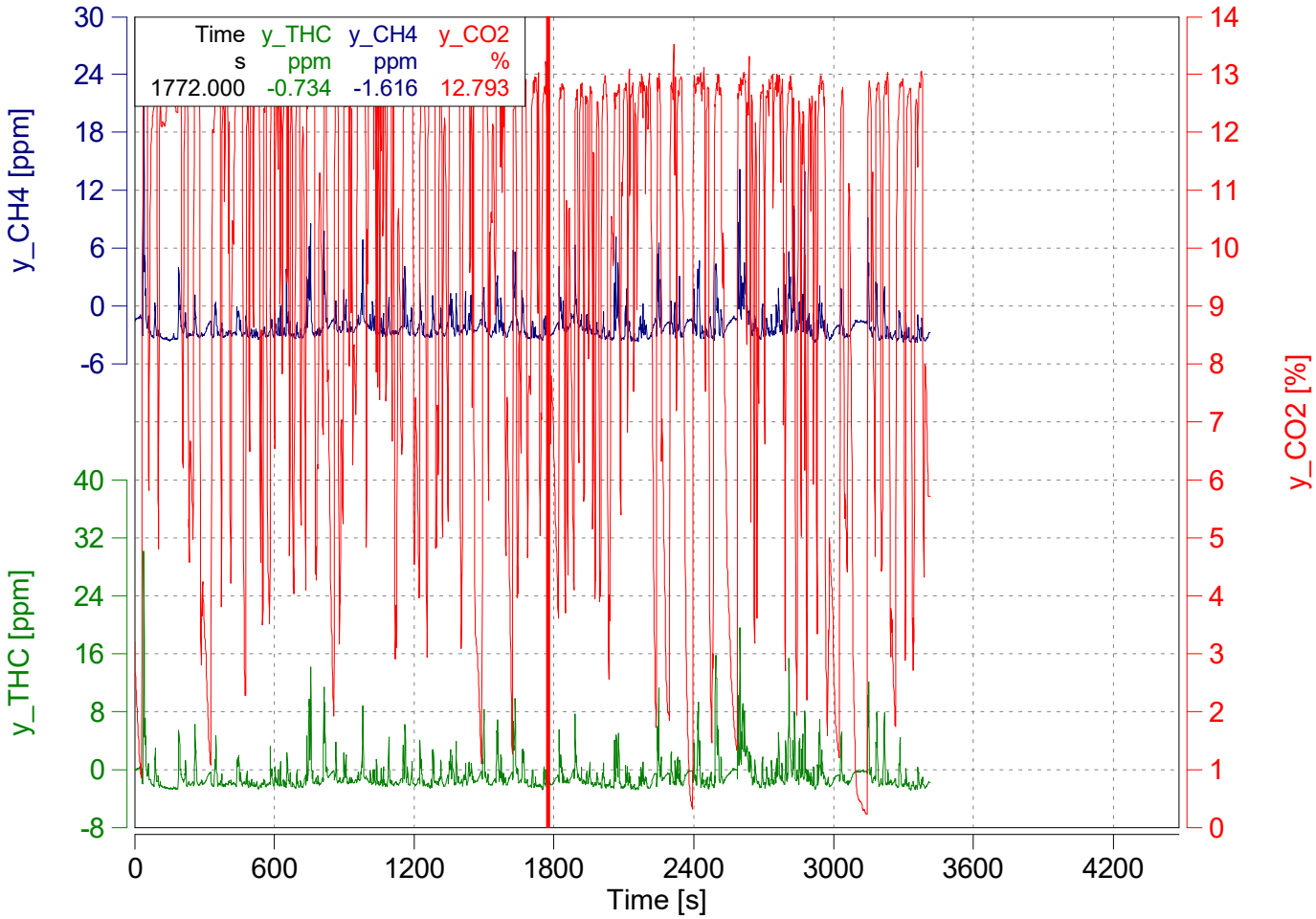
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: Time Alignment of Gas Concentrations

'LA City Route'
Start Date: 02/17/2021
Start Time: 10:17:10.0

AVL

Concerto M.O.V.E, 2019




Absolute Time Shifts

| | | |
|---|---|---|
| y_THC | s | -5.2 |
| y_CH4 | s | -7.2 |

Reset Time Shifts in Plot

Apply Current Values

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

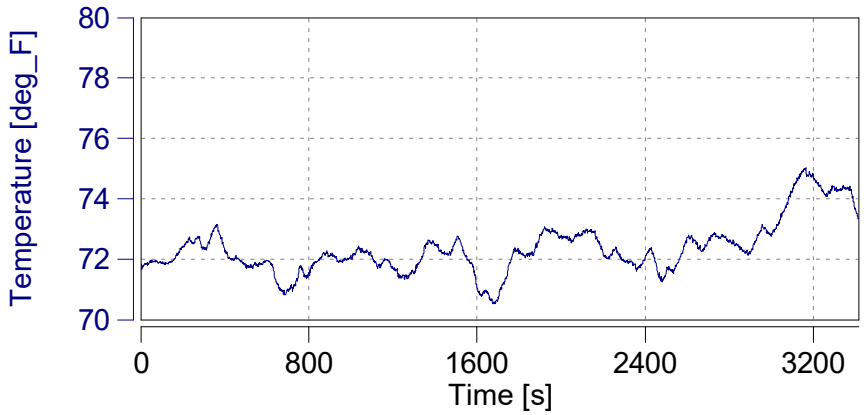
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

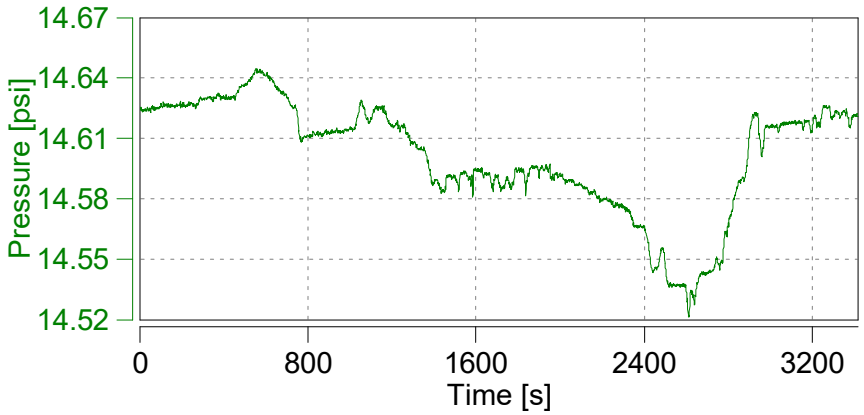
Case: W177-4577
Page: Ambient Conditions

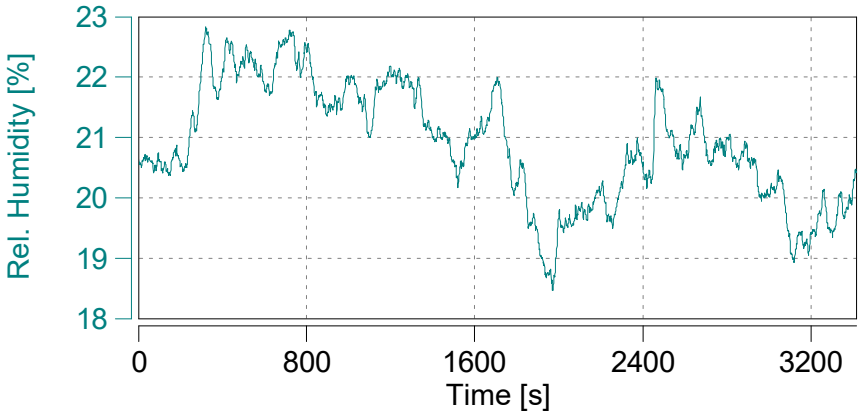
'LA City Route'
Start Date: 02/17/2021
Start Time: 10:17:10.0

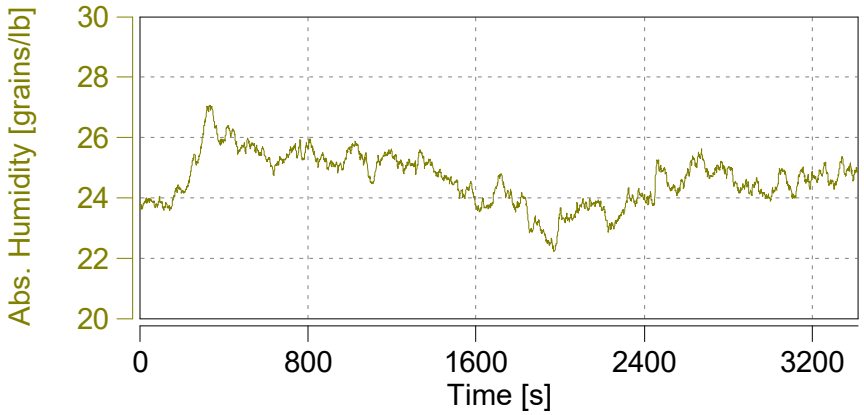
AVL

Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

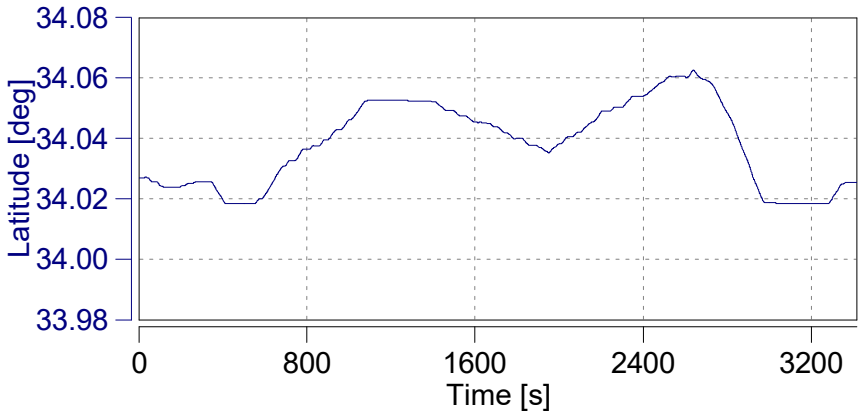
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

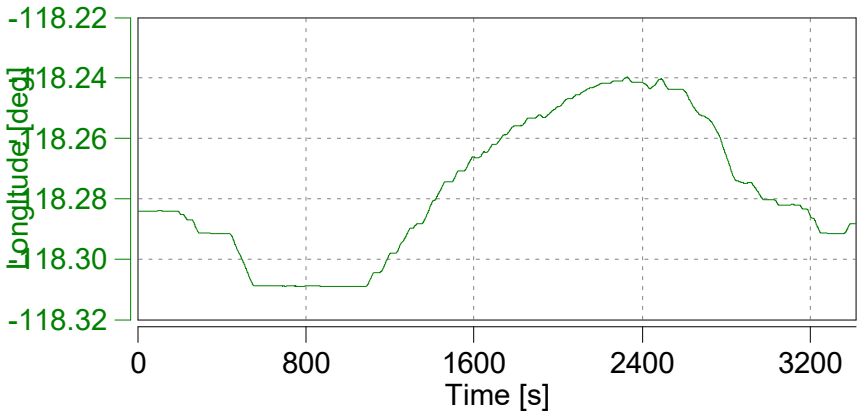
Case: W177-4577
Page: GPS

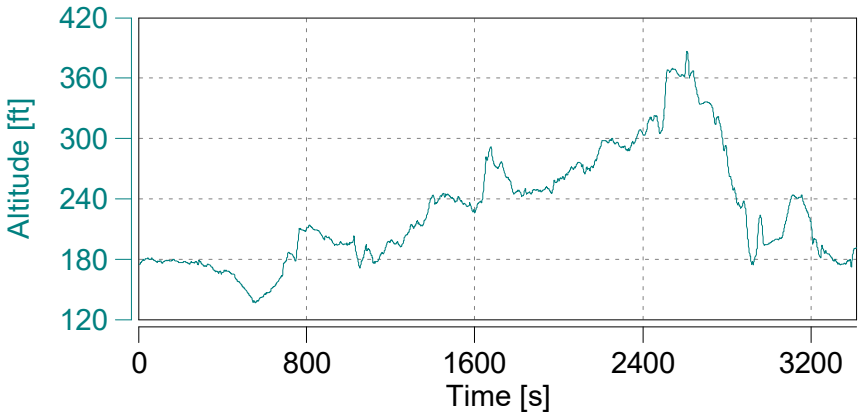
'LA City Route'
Start Date: 02/17/2021
Start Time: 10:17:10.0

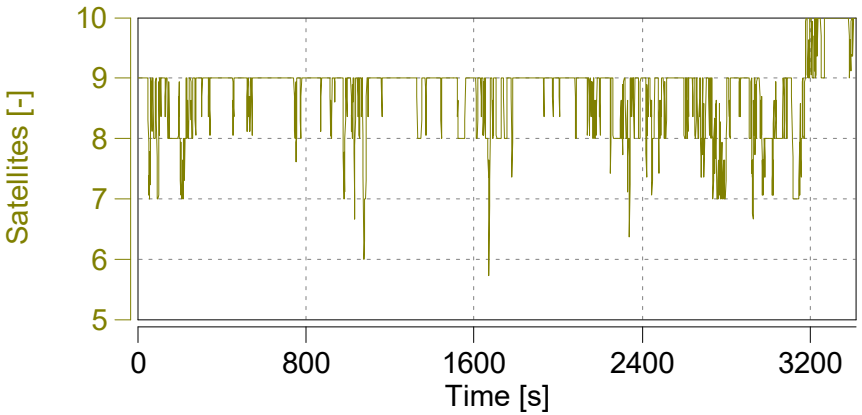
AVL

Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

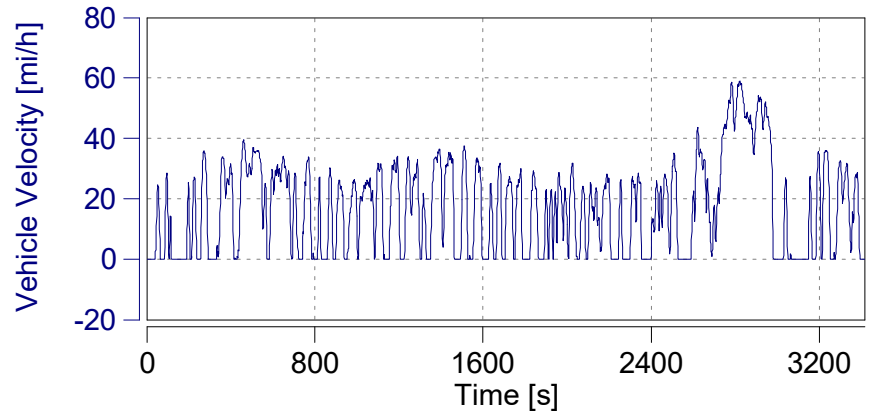
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

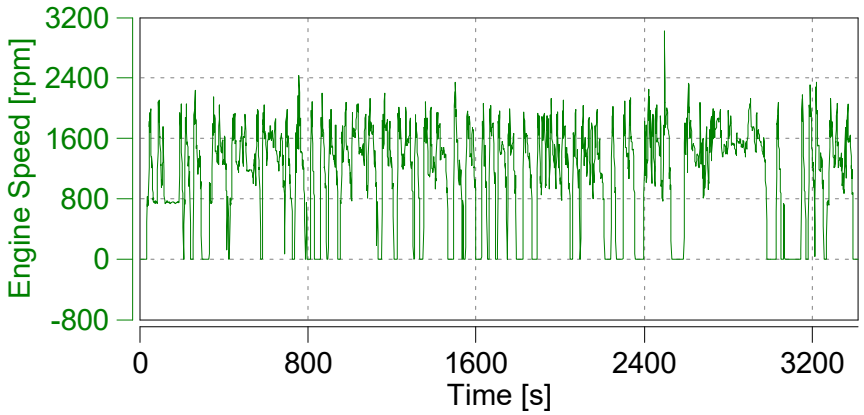
Case: W177-4577
Page: Engine (1)

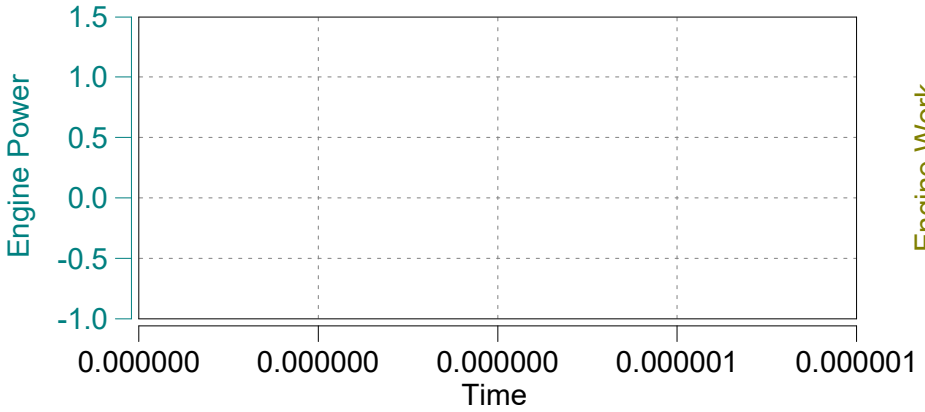
'LA City Route'
Start Date: 02/17/2021
Start Time: 10:17:10.0

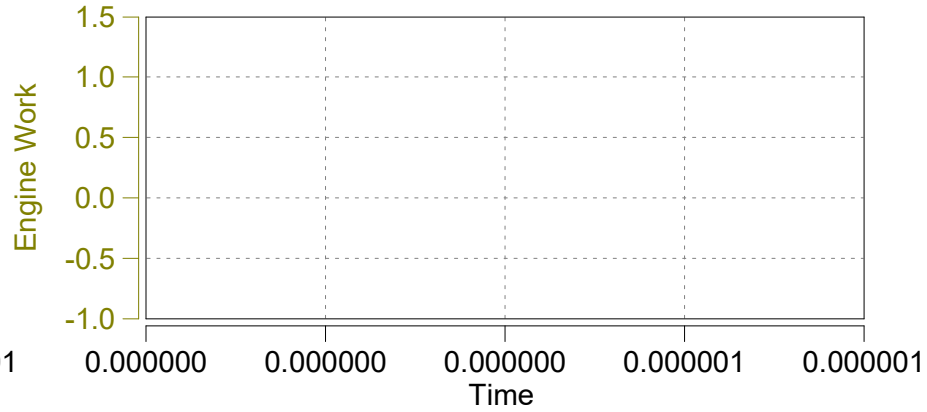
AVL

Concerto M.O.V.E, 2019



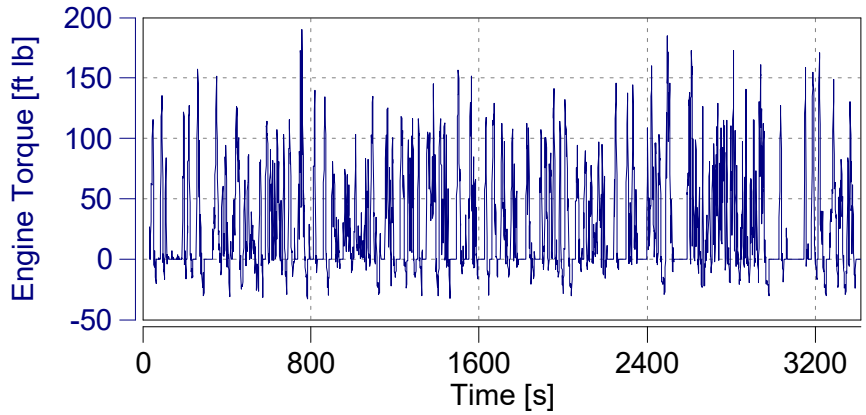

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

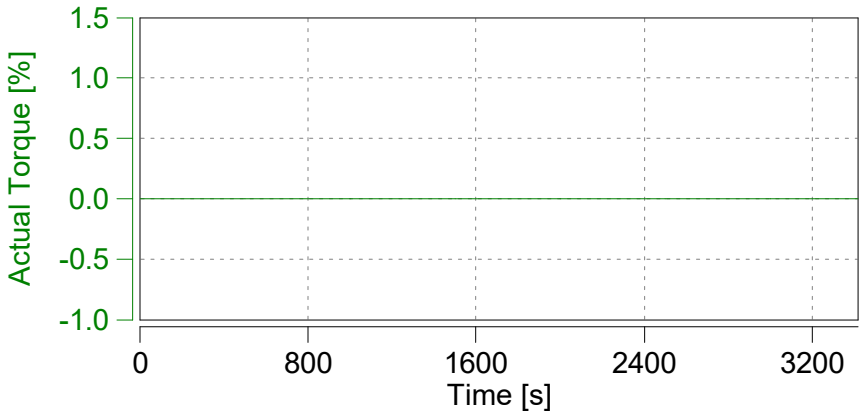
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

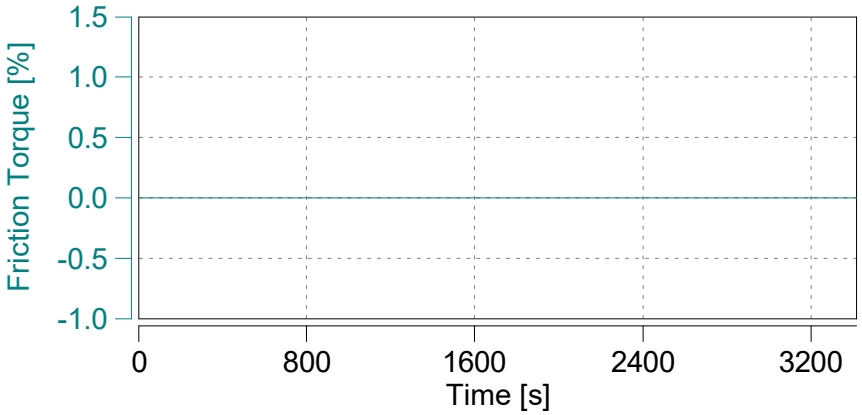
'LA City Route'
Start Date: 02/17/2021
Start Time: 10:17:10.0

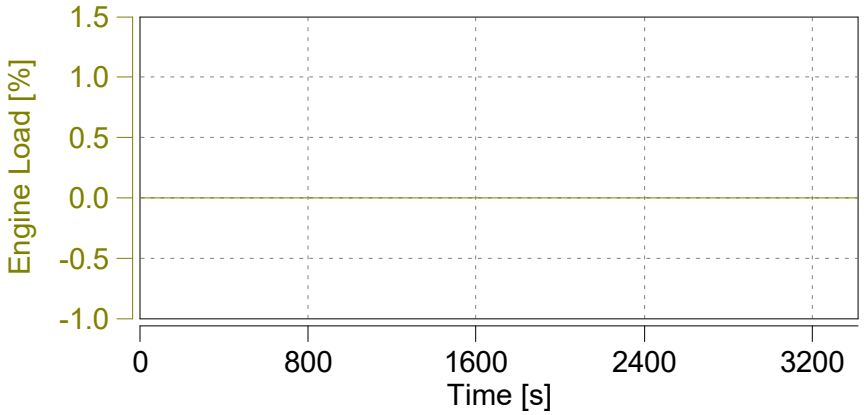
AVL

Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

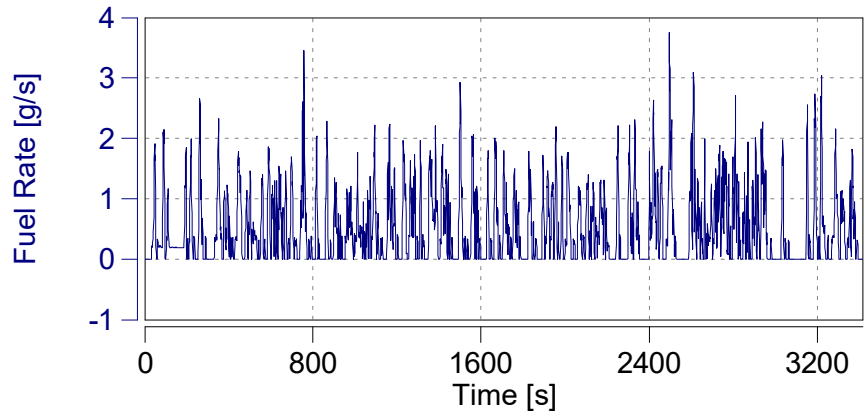
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

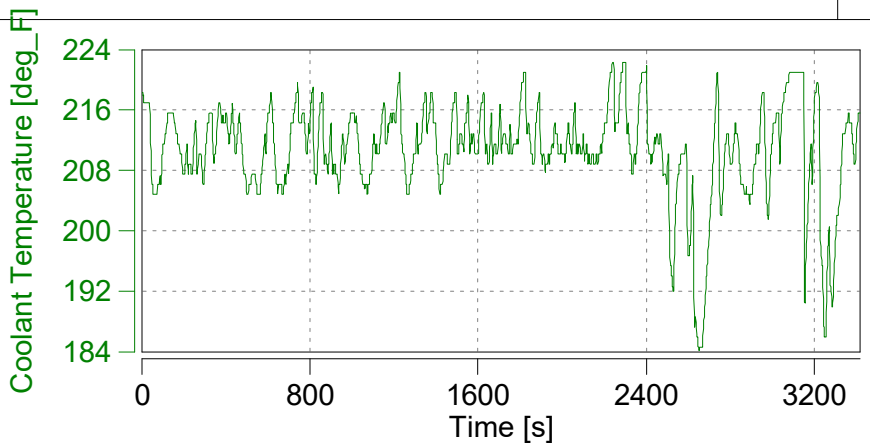
Case: W177-4577
Page: Engine (3)

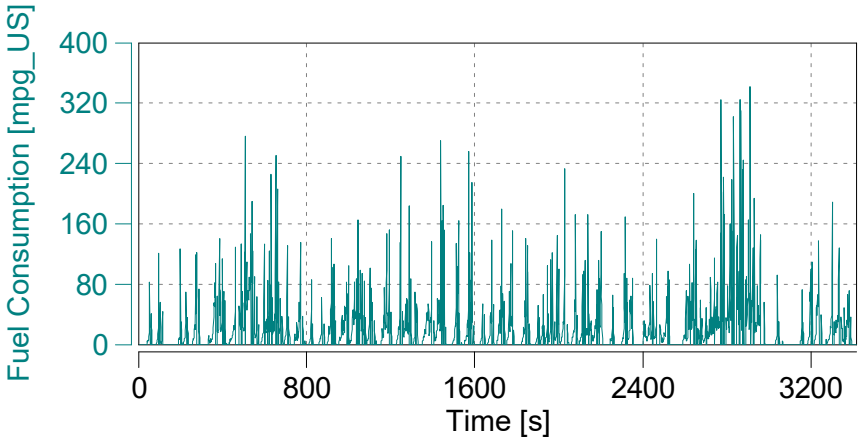
'LA City Route'
Start Date: 02/17/2021
Start Time: 10:17:10.0

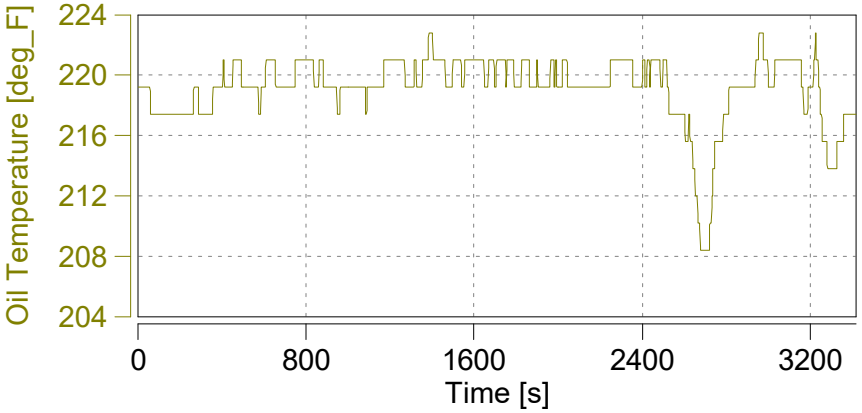
AVL

Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

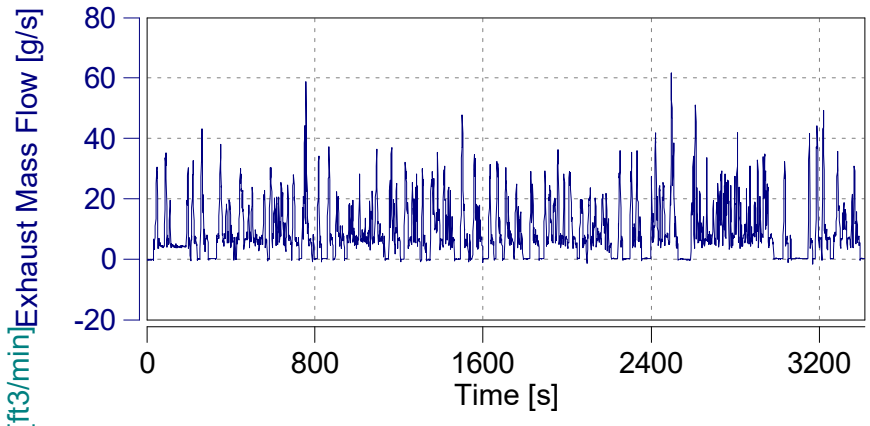
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

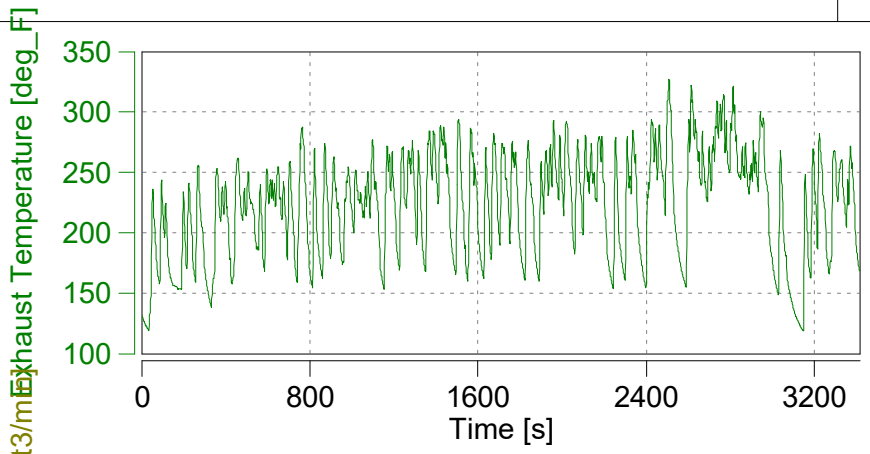
Case: W177-4577
Page: Exhaust Flow (1)

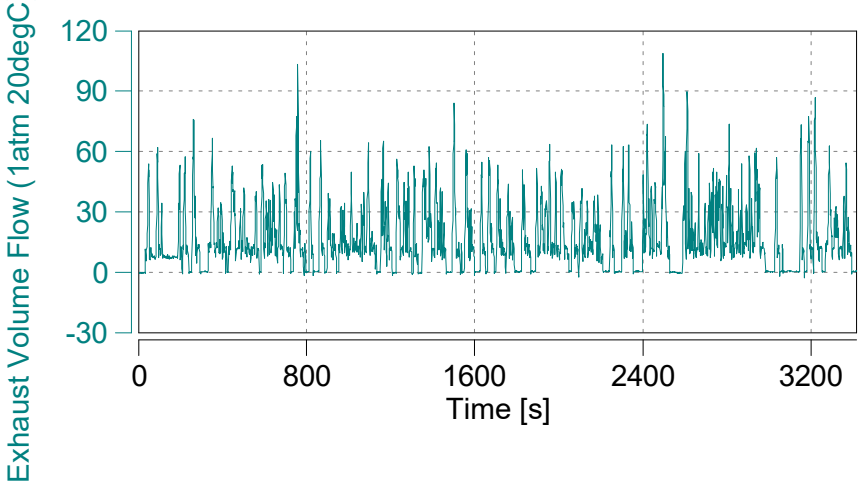
'LA City Route'
Start Date: 02/17/2021
Start Time: 10:17:10.0

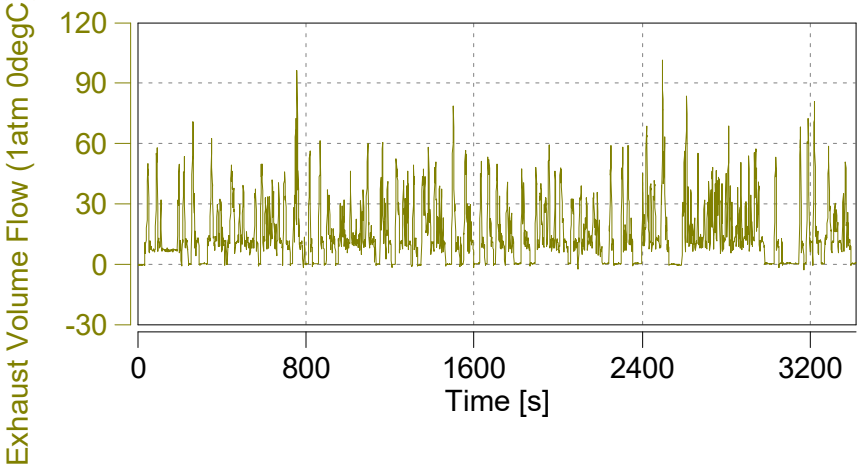
AVL

Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

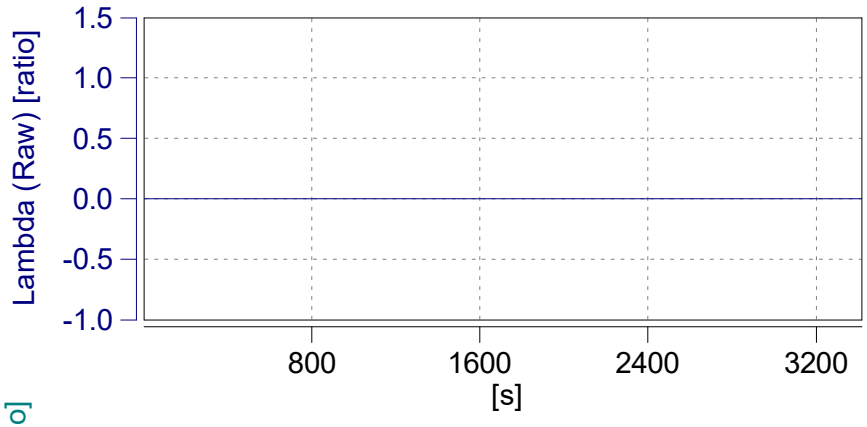
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

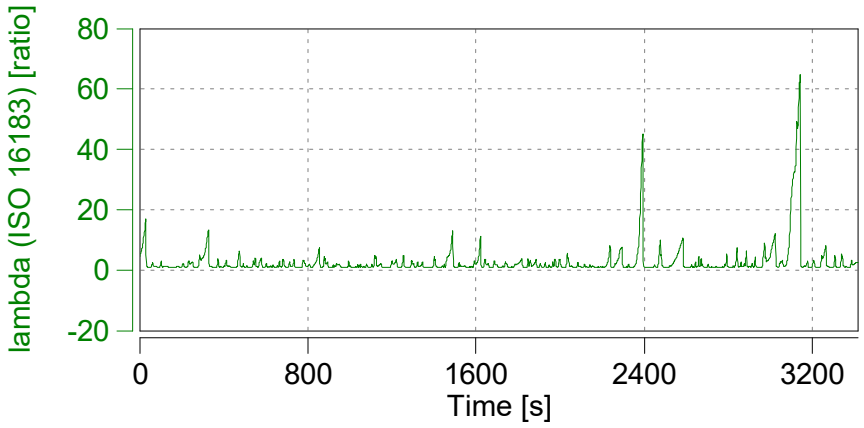
Case: W177-4577
Page: Exhaust Flow (2)

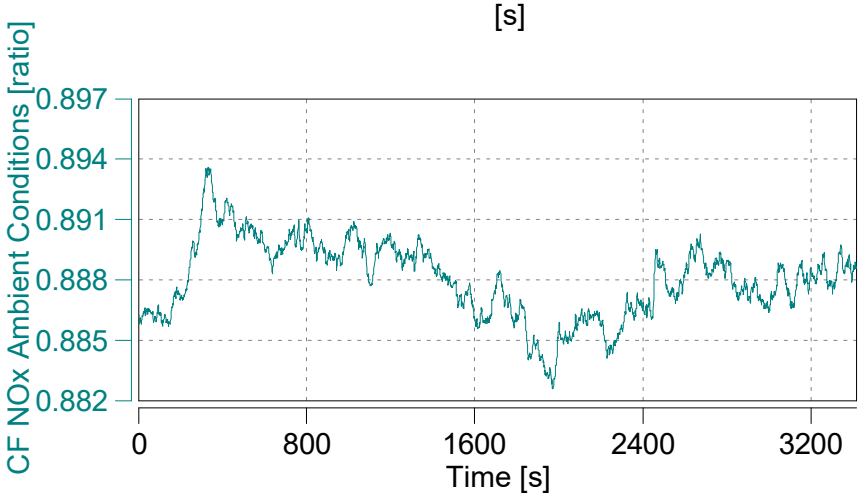
'LA City Route'
Start Date: 02/17/2021
Start Time: 10:17:10.0

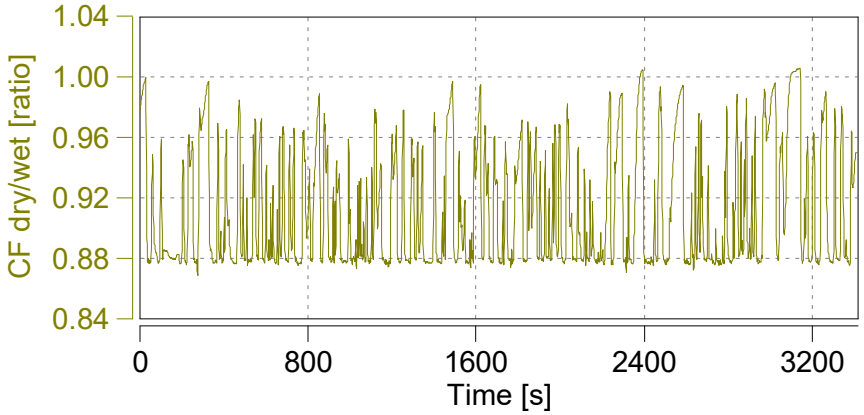
AVL

Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

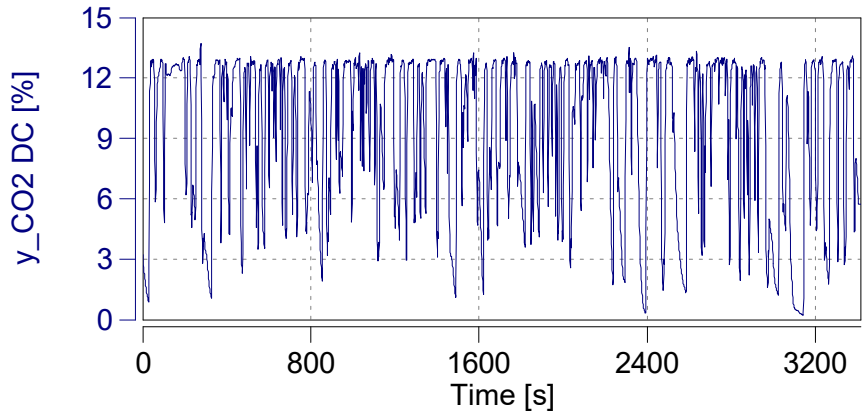
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

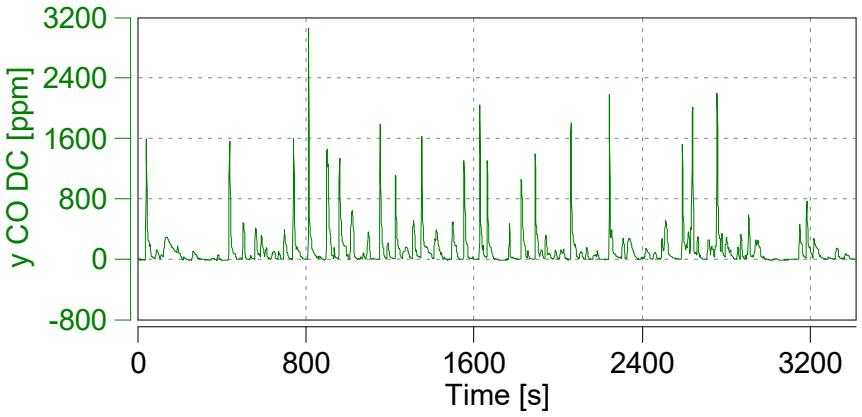
Case: W177-4577
Page: Corrected Emissions (1)

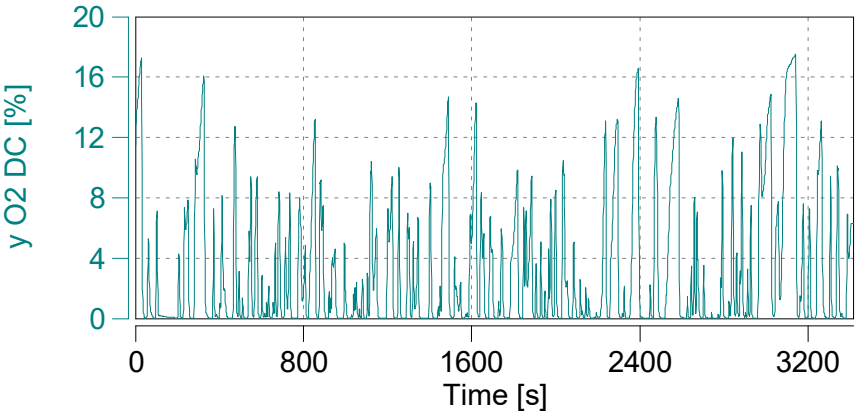
'LA City Route'
Start Date: 02/17/2021
Start Time: 10:17:10.0

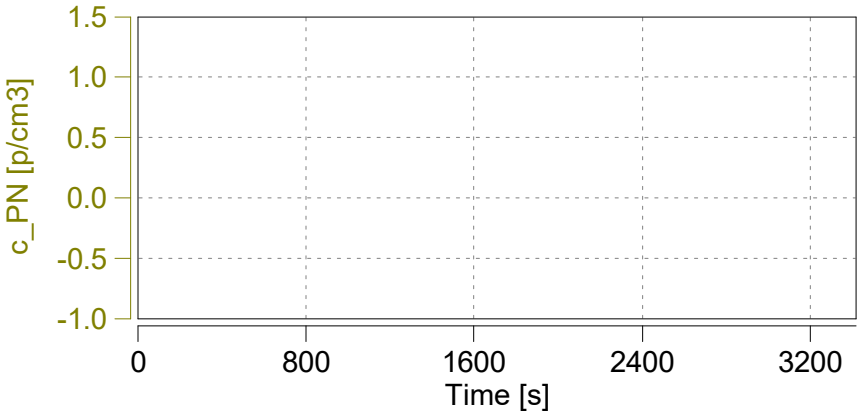
AVL

Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

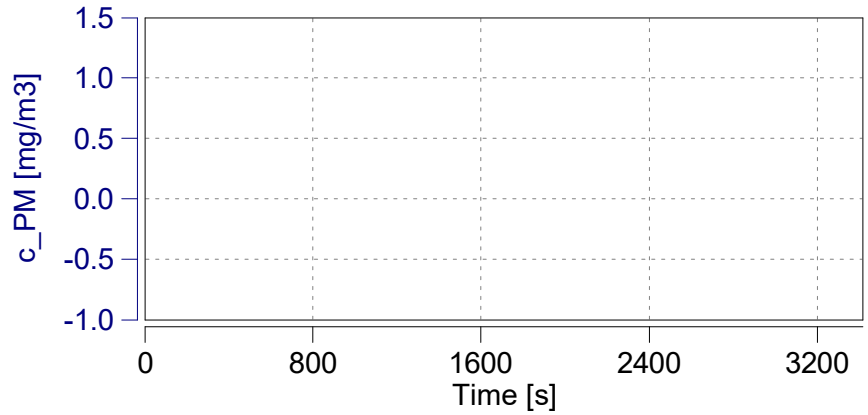
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

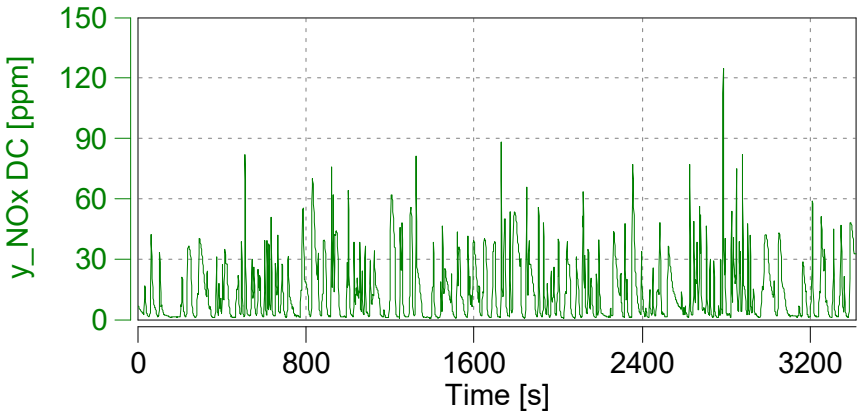
Case: W177-4577
Page: Corrected Emissions (2)

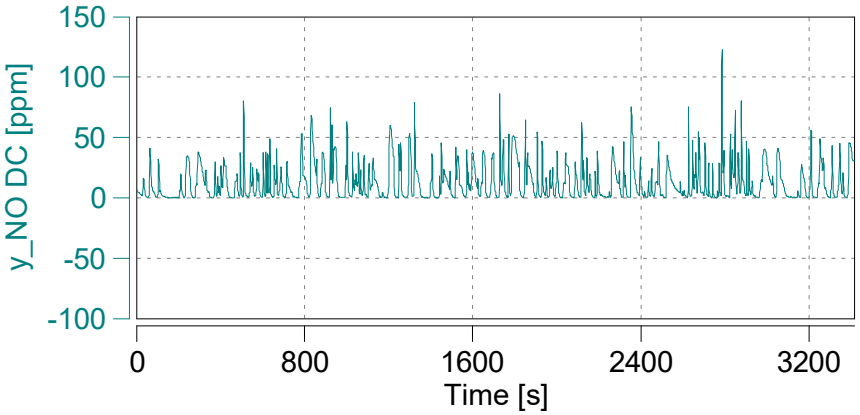
'LA City Route'
Start Date: 02/17/2021
Start Time: 10:17:10.0

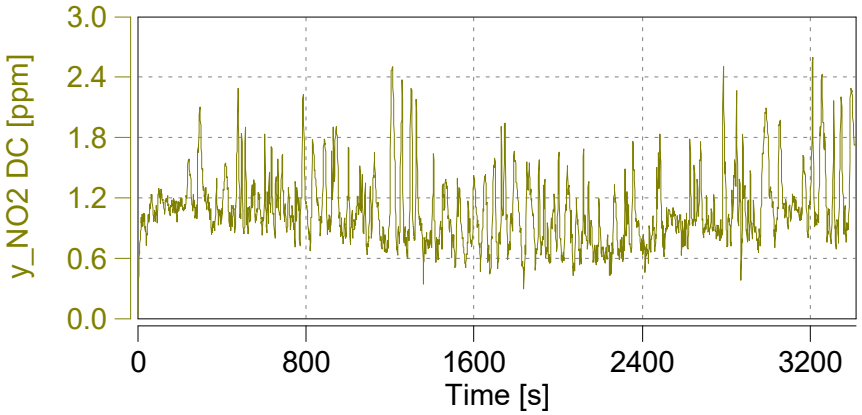
AVL

Concerto M.O.V.E, 2019



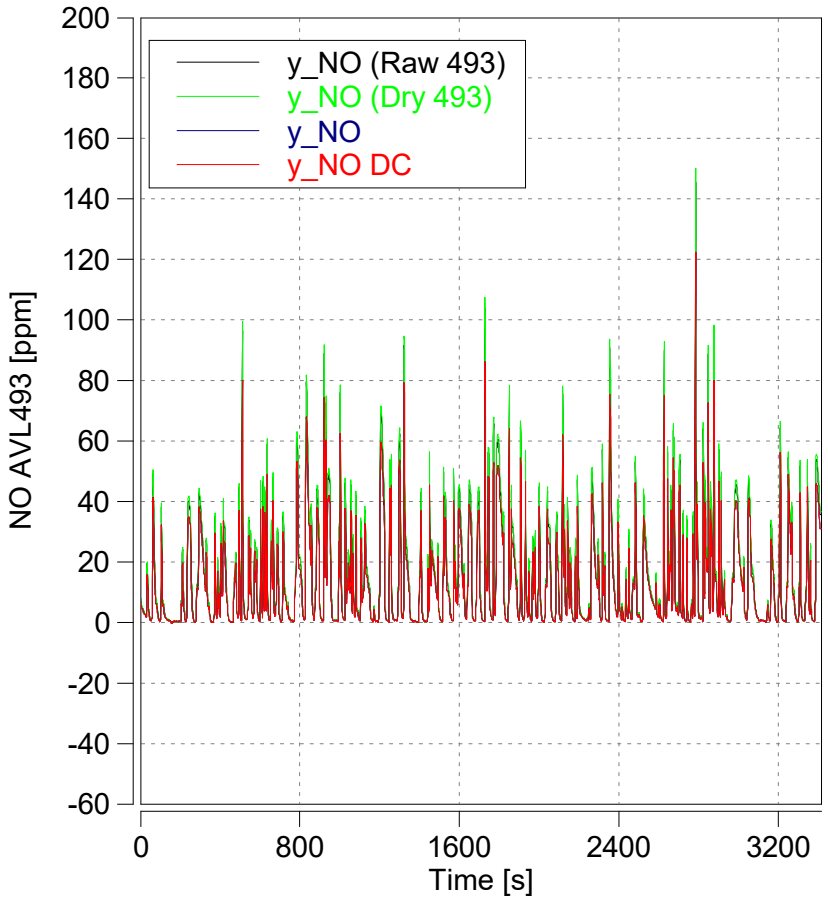

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

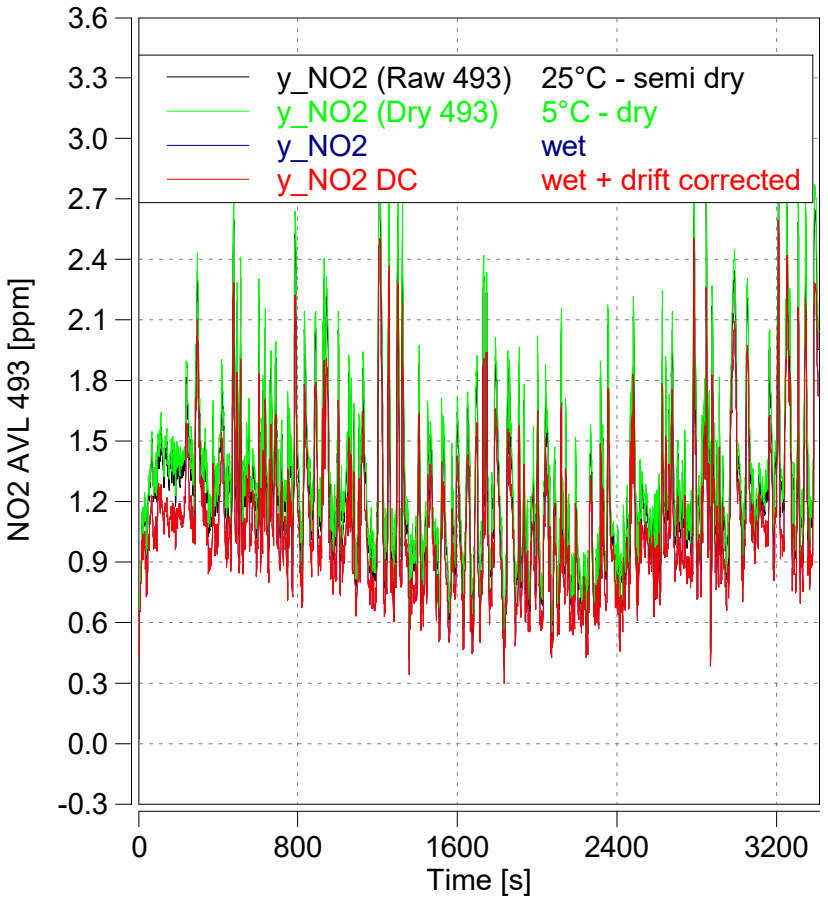
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: Corrected Emissions (3)

'LA City Route'
Start Date: 02/17/2021
Start Time: 10:17:10.0

AVL
Concerto M.O.V.E, 2019

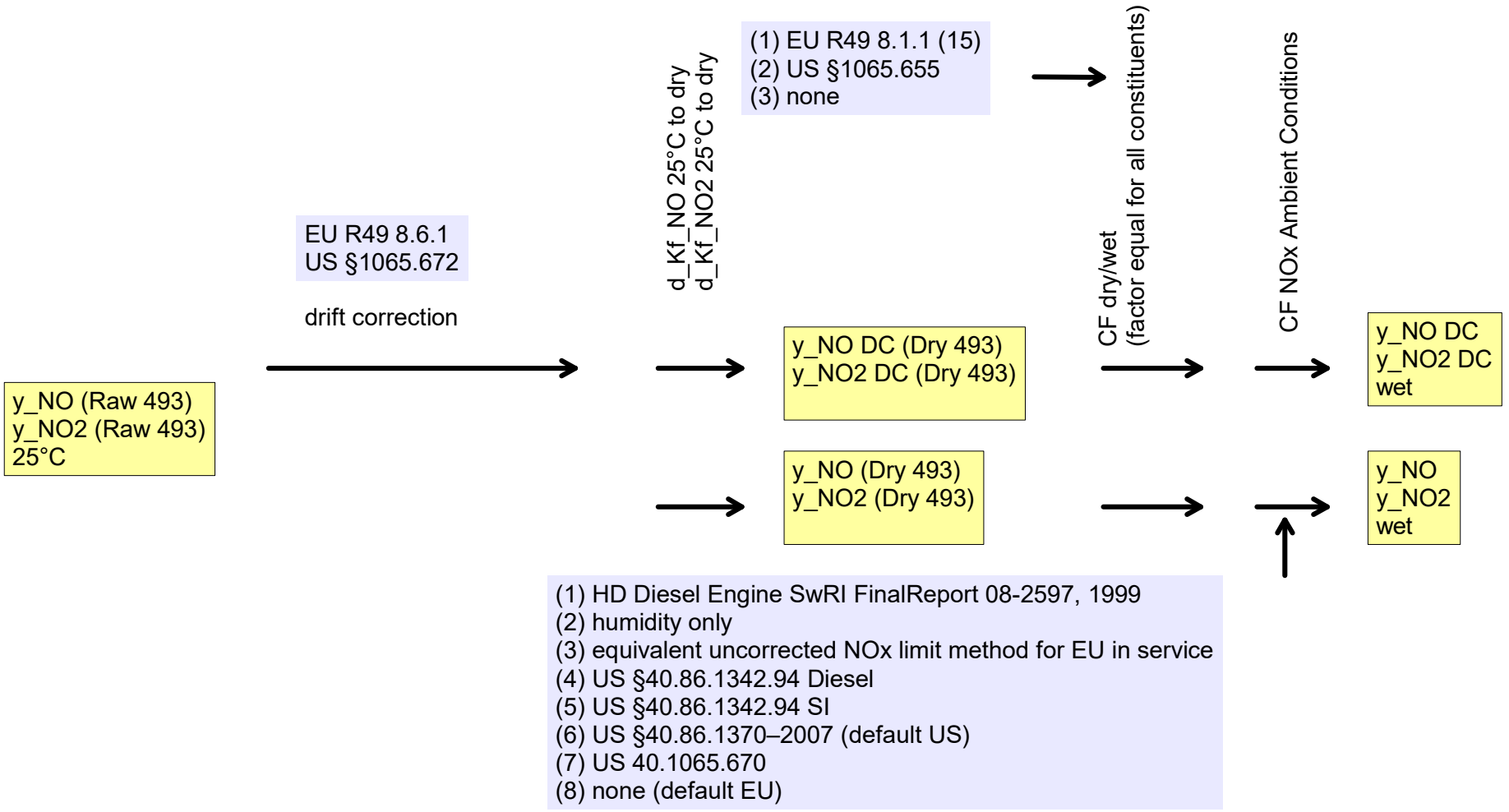



Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

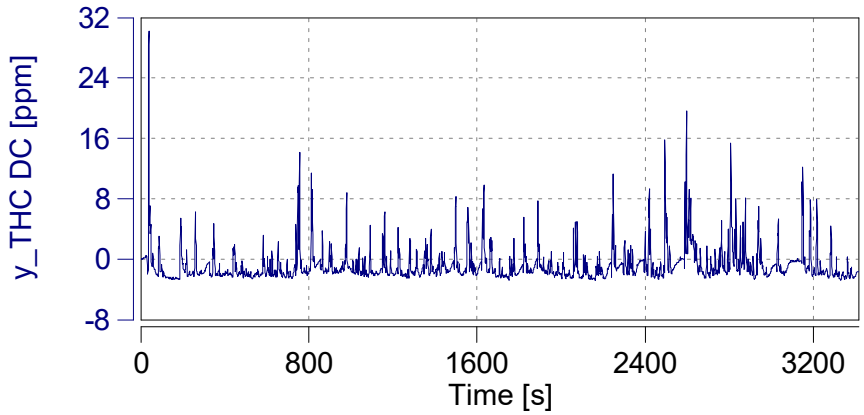
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

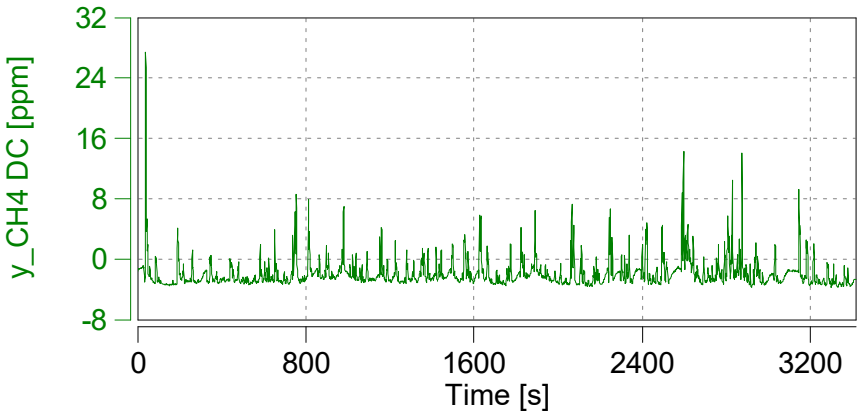
## NOx - AVL 493

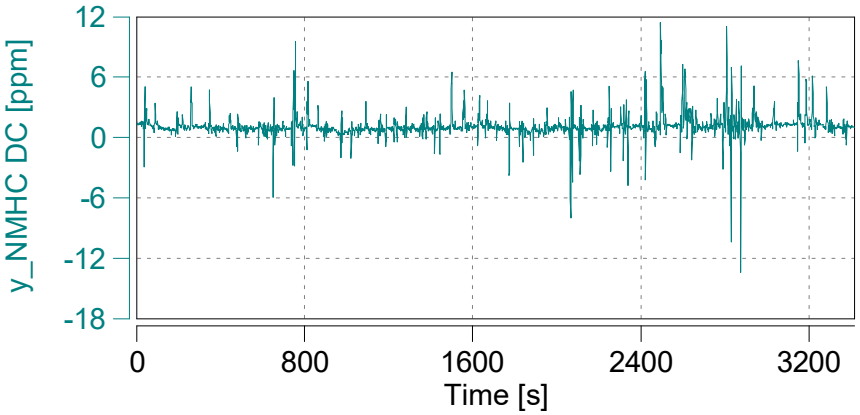

y_NO (Raw 493)
y_NO2 (Raw 493)
25°C
EU R49 8.6.1
US §1065.672
drift correction
d_Kf_NO 25°C to dry
d_Kf_NO2 25°C to dry
(1) EU R49 8.1.1 (15)
(2) US §1065.655
(3) none
y_NO DC (Dry 493)
y_NO2 DC (Dry 493)
y_NO (Dry 493)
y_NO2 (Dry 493)
CF dry/wet
(factor equal for all constituents)
CF NOx Ambient Conditions
y_NO DC
y_NO2 DC
wet
y_NO
y_NO2
wet
(1) HD Diesel Engine SwRI FinalReport 08-2597, 1999
(2) humidity only
(3) equivalent uncorrected NOx limit method for EU in service
(4) US §40.86.1342.94 Diesel
(5) US §40.86.1342.94 SI
(6) US §40.86.1370–2007 (default US)
(7) US 40.1065.670
(8) none (default EU)

'LA City Route'
Start Date: 02/17/2021
Start Time: 10:17:10.0





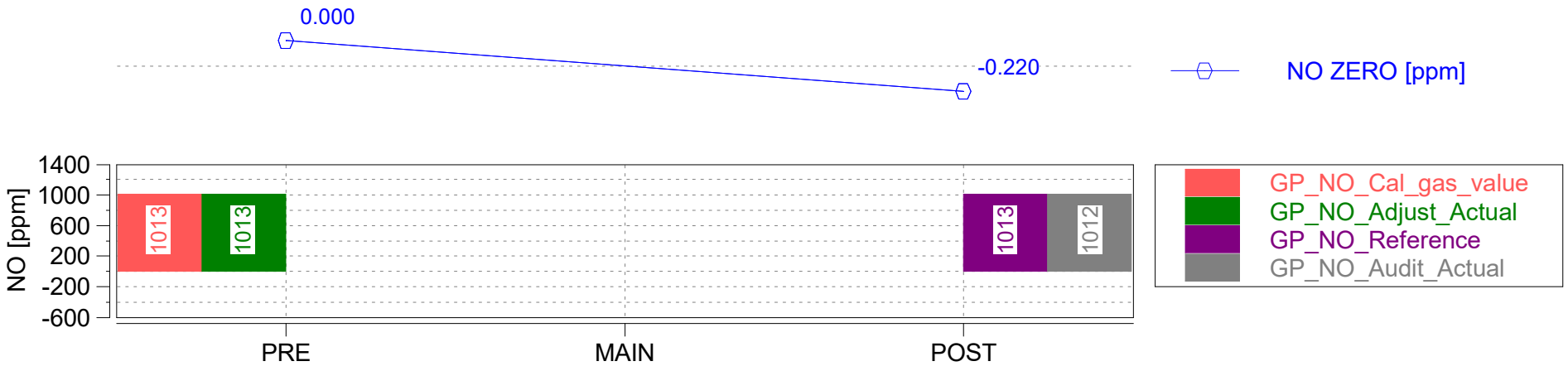

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

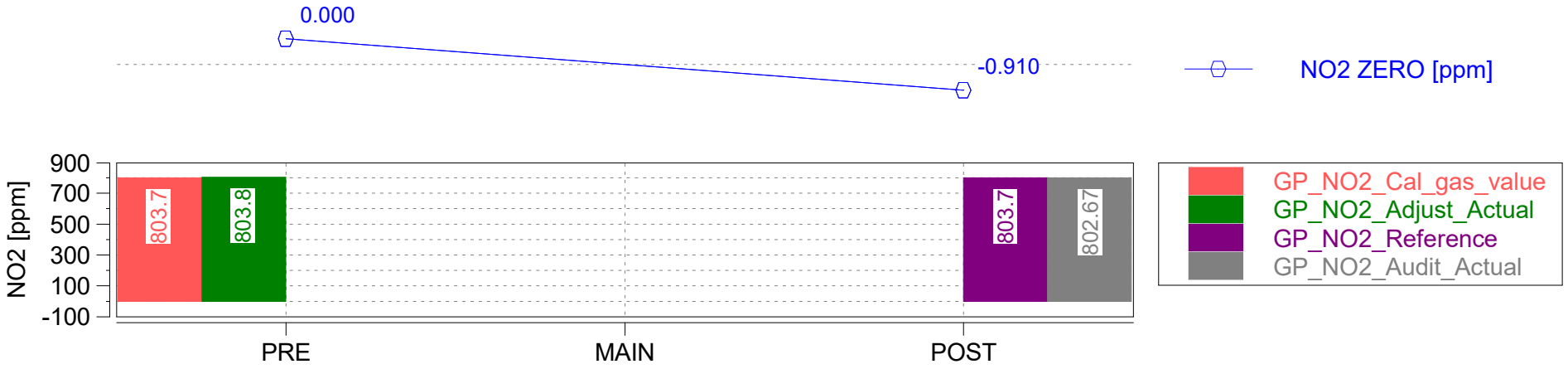
Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: NO/NO2/NOx Zero - Span

'LA City Route'
Start Date: 02/17/2021
Start Time: 10:17:10.0

AVL
Concerto M.O.V.E, 2019



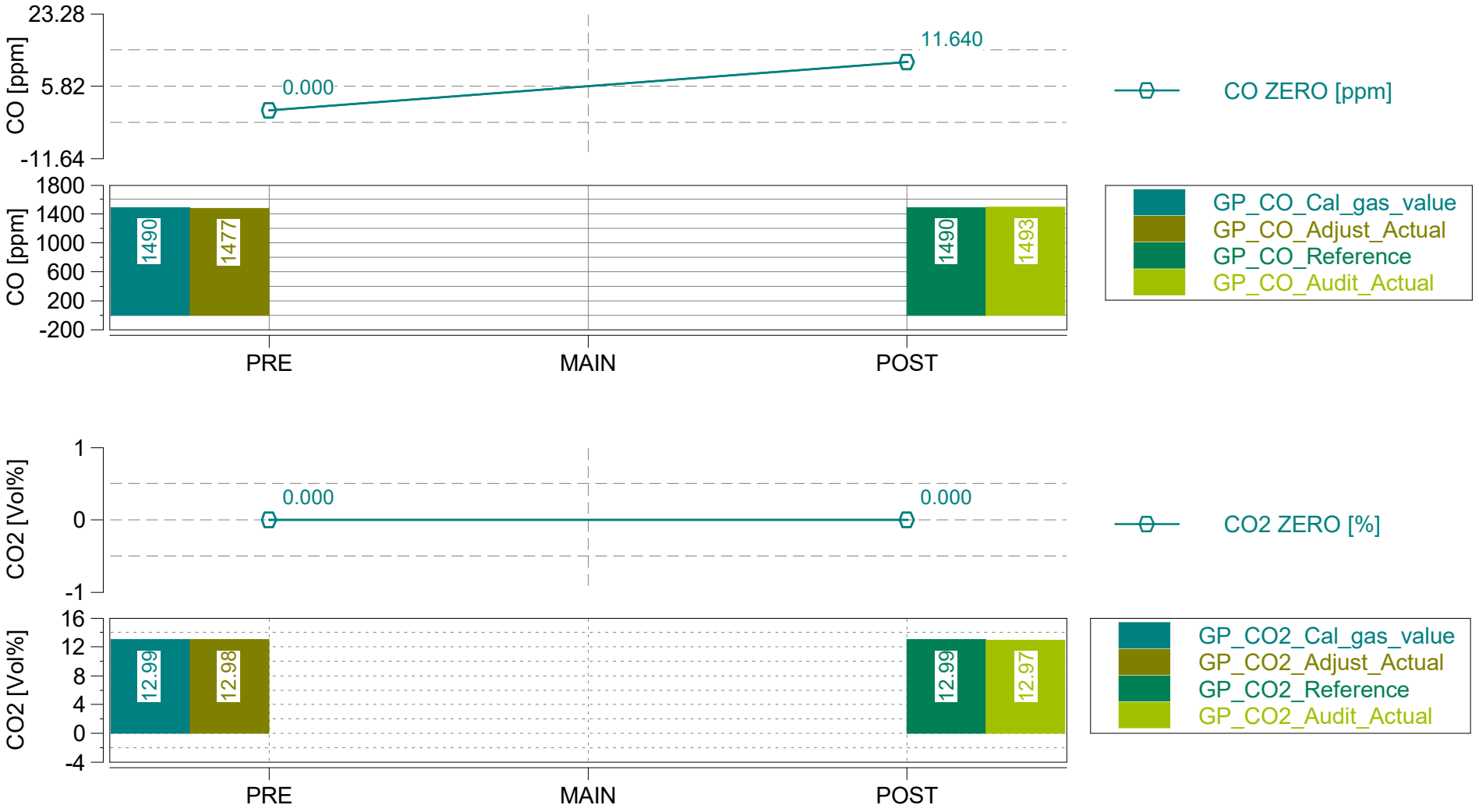

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: CO/CO2 Zero - Span

'LA City Route'
Start Date: 02/17/2021
Start Time: 10:17:10.0

AVL
Concerto M.O.V.E, 2019



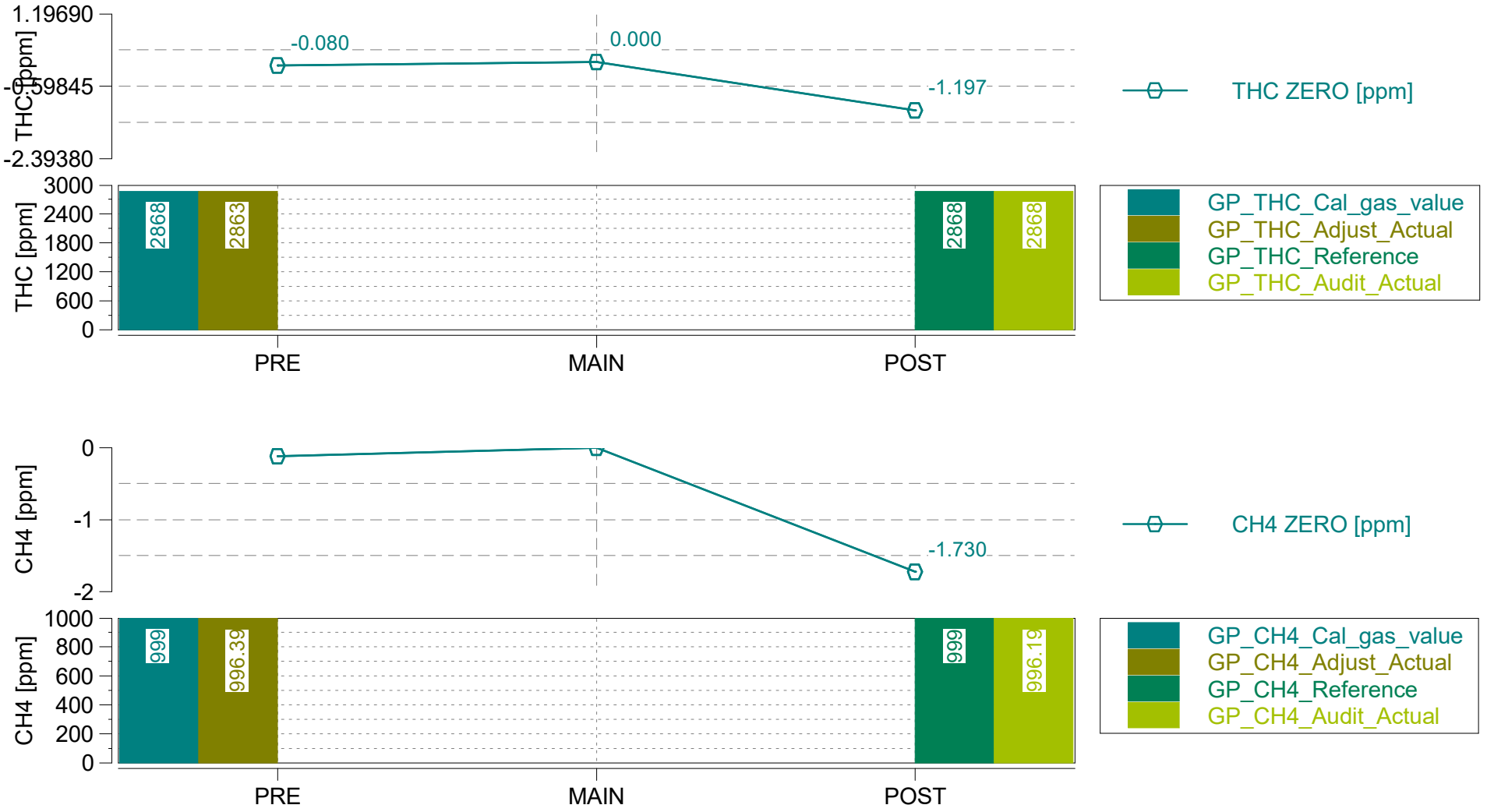

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

Case: W177-4577
Page: THC/CH4 Zero - Span

'LA City Route'
Start Date: 02/17/2021
Start Time: 10:17:10.0

AVL
Concerto M.O.V.E, 2019




Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90

| § | criterium | condition | value | unit | pass/fail |
|---|---|---|---|---|---|
| **GAS Leak Check** | The leakage rate on the vacuum side shall not exceed 0.5 per cent of the in-use flow rate for the portion of the system being checked. | The leakage rate <= 0.5% | **0.11** | **%** | pass |
| **PN Leak Check** | n/a | n/a | **n/a** | **n/a** | n/a |
| **PM Leak Check** | n/a | n/a | **n/a** | **n/a** | n/a |

GAS PEMS Devices

| | |
|---|---|
| Device ID | AVL492 |
| Serial Number | 0246 |
| Firmware Version | V1.10 |
| Main Test Date | 2021-02-17 |
| Leak Check Age [days] | 0 |

| | |
|---|---|
| Device ID | AVL4925 |
| Serial Number | 145 |
| Firmware Version | 1.17.0.3 |

EFM

| | |
|---|---|
| Device ID | AVL495 |
| Serial Number | 00826 |
| Serial Number Tube | 01080 |
| Firmware Version | V1.10 |

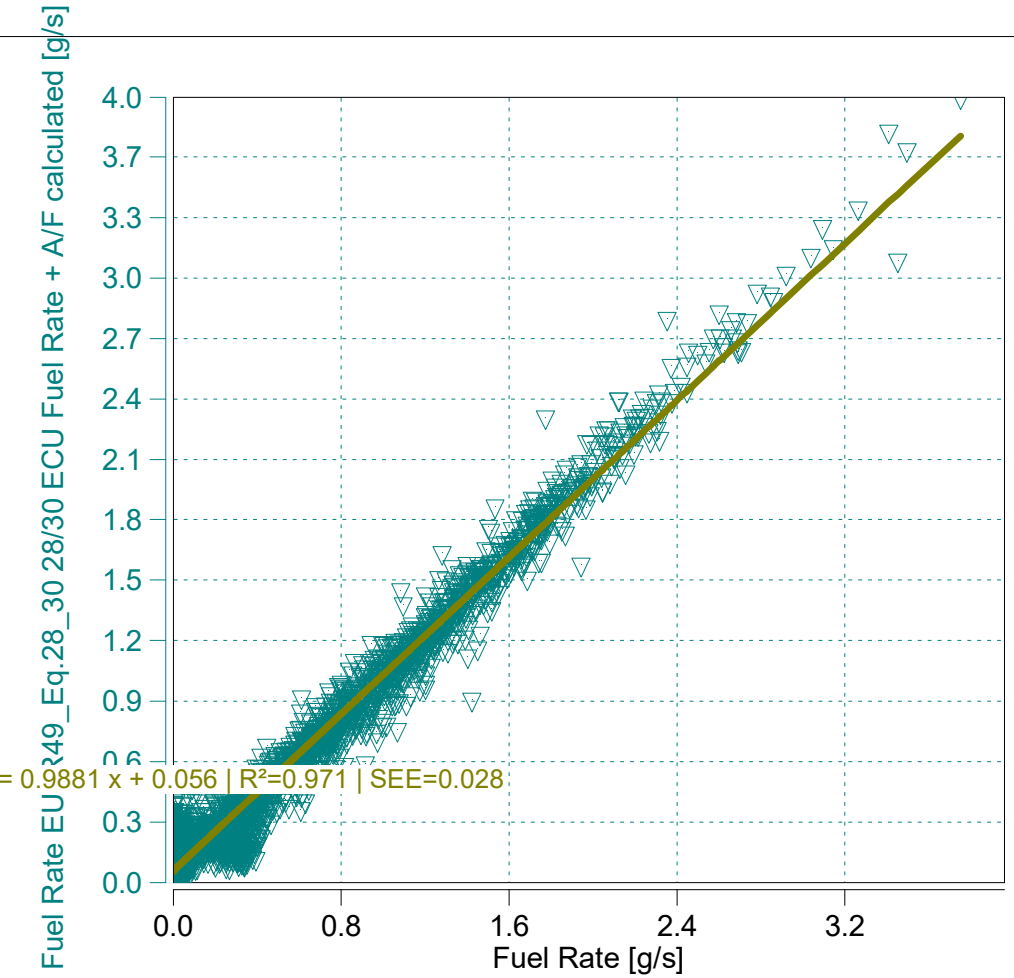
System Control

| | |
|---|---|
| SC Version | V2.6_212 |
| SC Serial Number | 60300923 |

Case: W177-4577
Page: Fuel Rate ECU vs. Calculated

'LA City Route'
Start Date: 02/17/2021
Start Time: 10:17:10.0

AVL
Concerto M.O.V.E, 2019




EU 582/2011/Appendix I/3.2.1 | Fuel Rate ECU and calculated

y = 0.9881 x + 0.056 | R²=0.971 | SEE=0.028
m = 0.99 (0.9 - 1.1 recommended)
R² = 0.97 (min 0.9 mandatory)

Data from - to [% of Maximum]

0 100

Concerto Version: 504 Build 119, Serial Number: 1604
M.O.V.E Post-Processing: DT_1R4.1_B340
Legislation:

Vehicle: W177-4577 /
Engine: /
NOx Ambient Condition Corr.: 7 - CFR40 §1065.670
Dry / Wet Corr.: 2 - CFR40 §86.1342-90