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The Inspection of In-Use Cars in Order to Attain Minimum Emissions of Pollutants and Optimum Energy Efficiency

Detailed Report 3 :
TEST PROTOCOL AND AVERAGE RESULTS OF LONG AND SHORT EMISSION TESTS FOR PASSAGER CARS

by INRETS
Report LEN N° 9806

June 1998

Project funded by the European Commission
Directorate Generals for Environment (DGXI), Transport (DG VII) and Energy (XVII)

INSTITUT NATIONAL DE RECHERCHE SUR LES TRANSPORTS ET LEUR SÉCURITÉ

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The report describes various driving cycles and gives the results of rapid tests used for measuring emission levels during vehicle technical inspection. The study was aimed at determining short tests enabling to detect high polluting vehicles during technical inspection at the lowest cost. 5 typical driving tests were carried out (standard cycles, long cycles, short cycles, idle and full load steady state tests) over a sample of 41 gasoline vehicles, 192 catalyst vehicles and 28 diesel vehicles, in order to detect high polluters. After a maintenance operation, the vehicles were tested again using the various driving cycles defined. 22 gasoline vehicles, 56 catalyst vehicles and 3 diesel vehicles were maintained. Measurements were performed in five different laboratories. Differences can be observed between the various laboratories in terms of vehicle features and test performance conditions.
The analysis performed demonstrates a good agreement between a number of tests and a satisfactory improvement in the results recorded after a maintenance operation. Nevertheless the emission levels remain higher after maintenance as compared to non maintained vehicles.</td></tr>
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13 Résumé

Ce rapport décrit des cycles et les résultats des tests rapides de mesures des émissions lors du contrôle technique des véhicules. L'objectif est de trouver des tests courts permettant de détecter les gros pollueurs lors du contrôle technique à un moindre coût. A partir d'un échantillon de 41 véhicules essence, 192 véhicules catalysés, 28 véhicules diesels, nous avons réalisé 5 types de test de conduite (les cycles standard, les cycles long, des cycles courts, les tests "idle" et le test "full load steady state" afin de détecter les véhicules gros pollueurs. Après avoir maintenu ces véhicules, nous avons de nouveau effectué les différents cycles de conduites. Nous avons maintenu 22 véhicules à essence, 56 véhicules catalysés et 3 véhicules diesels. Les mesures ont été faites par cinq laboratoires différents, nous constatons une différence entre les laboratoires au niveau des caractéristiques des véhicules et des conditions de réalisation des tests.

L'analyse montre une bonne correspondance entre certains tests ainsi qu'une bonne amélioration des résultats après maintenance bien que les émissions demeurent plus élevées après maintenance par rapport aux véhicules non maintenus.

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Content

Introduction

This report is one of the available detailed reports related to the Inspection Maintenance project.

The major objectives of the study are summarised below:

- To review a large set of short tests for the in-use passenger cars, which could be performed in the near future by inspection centres. Such tests were found in the international literature (national regulations included) or proposed by the study team.
- To study the performance of these short tests in terms of identification possibilities of high emitting cars. The results of the short tests performed will be compared to the emission levels as measured according to both European legislated and representative driving cycles.
- To study the performance of one remote sensing technique, especially when coupled to short tests.
- To study and quantify the likely impact of vehicle maintenance on the global emissions of car fleets across Europe and the ability of the short tests to verify the effectiveness of maintenance.
- To study the technical, human and financial conditions of each test.
- To propose a set of short tests for the European legislation, chosen to be technically feasible and environmentally effective.

The focus is on catalyst equipped cars of the current technology, as they will constitute the major part of the fleet in the turn of the century, i.e. when it is envisaged to introduce enhanced I/M schemes at European level as well. Nevertheless, both conventional spark-ignition and diesel cars are also covered by the study.

In the first part tests, vehicle samples and data file are described.

Average results for various test performance conditions are given in the second part. The influence of maintenance on pollutant emissions and of the vehicle selection method on emissions is analysed as a function of the test vehicle type.

The third part analyses the relationships between various parameters. The correlations between main parameters and the relationships between standard, current and short cycles are presented for each engine type.

1. Description of measurements and data file

1.1. Description of the tests

For each vehicle five types of tests were performed:

- standard cycles to know the standard emissions:
  - European NEDC cycle (ECE 15 performed under cold start conditions followed by the EUDC cycle),
  - then the ECE 15 performed under hot start conditions.
- actual long cycles on chassis dynamometer to know the actual level of emissions. These 4 cycles are representative of real use conditions of the passenger cars in Europe, and have been designed especially for these tests (see see André et al., 1998) from the DRIVE-modem data base (André et coll., 1992; André et coll., 1995). They are called modem IM slow urban, free-flow urban, road, and motorway.
- short cycles on chassis dynamometer, which are possible inspection cycles: (see André et al., 1998)
  - the so called TÜV-A cycle which has the same shape than the NEDC. In fact this cycle is performed two times, but only the second cycle is taken into account in the data processing.
  - the so called modem IM short cycle which has been developed in the same way than the other modem IM cycles.

  These short cycles are performed with vehicle's reference inertia weight and then with simple inertia weight setting, when it is different from the reference one.
- idle tests, which do not need a chassis dynamometer:
  - at idle at a speed of 3000 rpm with the transmission in neutral position, for gasoline vehicles only.
  - at idle with the transmission in neutral position, for gasoline vehicles only.
  - at a free acceleration with the transmission in neutral position, for diesel vehicles only.
  - the Autonat test, performed only by Inrets (see CRMT, 1994).
- a full load steady state test, which is a simple test on chassis dynamometer: at 50 km/h at third gear for a constant power absorption of 7 kW (so called 50/7).

These tests are performed systematically for as-received vehicles. Then, if the vehicle exceeds by more than 50 % its standard emission level for one pollutant (CO, HC, NOx or HC+NOx, for the cold ECE15 or NEDC, according to the standard), the vehicle is maintained and the same tests are performed a second time.

Table 1 briefly summarises the various driving cycles, fig. 1 describes the cycles versus average speed and acceleration standard deviation. The test are described in detail for gasoline vehicles

in annexes 1 and 2, and for the diesel vehicles in annexes 3 and 4. Driving cycles are drawn in annex 5: speed versus time curve and speed versus acceleration points for each standard, actual long and short driving cycle.

name	duration (s)	distance (m)	speed (km/h)	accel. st. dev. (m/s^2)
ECE15	780	4 052	18.7	0.487
EUDC	400	6 955	62.6	0.395
NEDC (= ECE15 + EUDC)	*1180*	*11 007*	*33.6*	*0.458*
modem IM slow urban	428	1 705	14.3	0.583
modem IM free-flow urban	355	2 248	22.8	0.702
modem IM road	712	8 485	42.9	0.685
modem IM motorway	452	12 683	101.1	0.418
modem IM weighted			*49.22*	
TÜV-A	200	1 969	35.4	0.535
modem IM short	255	2 246	31.7	0.723

name	acc. x speed (m^2/s^3)	idling duration (s)	runing speed (km/h)	maximal speed (km/h)	% total distance (%)
ECE15	-0.11	252	27.6	50.0	
EUDC	-0.07	41	69.7	120.0	
NEDC (= ECE15 + EUDC)	*-0.10*	293	44.7	120.0	
modem IM slow urban	-0.18	134	20.9	42.3	17.4
modem IM free-flow urban	-0.27	71	28.5	62.3	40.5
modem IM road	-0.25	96	49.6	109.2	12.4
modem IM motorway	-0.11	11	103.5	128.7	29.7
modem IM weighted					100
TÜV-A	-0.14	51	47.6	90.0	
modem IM short	-0.26	51	39.6	69.7	

Table 1: Main characteristics of used driving cycles.

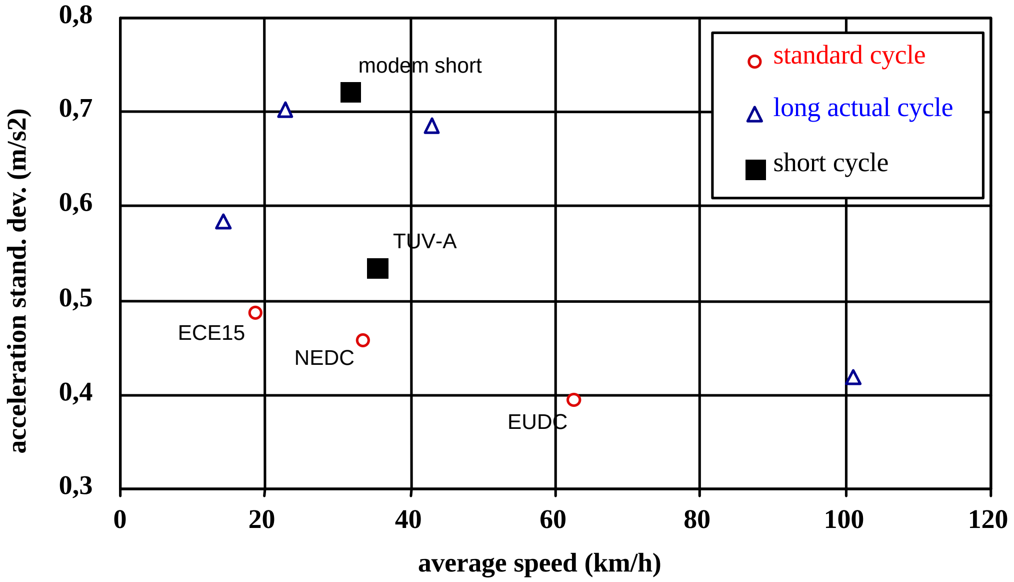


Figure 1 : Driving cycle description as a function of average speed and acceleration standard deviation

The emission measurements performed depend on the test:

- for the long cycles (standard or actual ones): CO, CO_2, HC, NOx and particulates for diesel vehicles are measured for each cycle; the fuel consumption is calculated from CO, CO_2, HC and particulate emissions as a function of the carbon atom balance. All these figures are expressed in g/km (g equivalent $CH_{1.85}$ for HC, g equivalent NO_2 for NOx).
- for the short cycles:
  - CO, CO_2, HC, NOx and fuel consumption expressed in g/km,
  - average, percentiles 50, 60, 70, 80, 90 and maximum of CO, CO_2, HC, NOx raw concentrations (expressed in ppmV or %) and of opacity for diesel vehicles only (expressed in m^{-1}),
  - diluted average concentrations of CO, CO_2, HC and NOx.
- for the idle and full load steady state tests:
  - the air fuel ratio λ,
  - garage analyser concentrations of CO, CO_2, HC, NOx, and opacity for diesel vehicles,
  - laboratory analyser concentrations of CO, CO_2, HC and NOx,
  - only for diesel vehicles tested by Inrets with Autonat test: the average opacity in acceleration, in steady state and globally, the maximum opacity and the maximum opacity flow.

If emission factors expressed in g/km have been measured for all tested vehicles, some pollutant concentrations in the exhaust haven't been always measured (with a garage or a laboratory analyser, diluted concentrations), according to the laboratory.

The vehicle and emission data provided by each laboratory are listed in annex 5.

1.2. Vehicle sample

The main part of the vehicle sample is chosen randomly in each national fleet in order to be representative of each fleet in terms of age, make, engine capacity.... Therefore 167 vehicles are chosen by this way. A second part of the sample comes from national vehicle inspection authorities and are chosen as a priori high emitters: it is the case for 36 vehicles tested by TÜV and TNO. A third part of the sample comes from remote sensing tests performed in parallel to the tests described here (see detailled report n°6): these vehicles are also a priori high emitters. No one remote sensing vehicle is taken into account in this first version of the data processing.

Some of the tested vehicles are tested again after maintenance, if they exceed by more than 50 % their standard emission level for one pollutant at least.

(choice type)	main-tenance	random	german AU (TÜV)	as high emitter (TNO)	from Remote Sensing tests	total
conventional gasoline	before	14	-	-	27	41
	after	*7*	-	-	*15*	*22*
gas. 3-way catalyst	before	135	16	12	29	192
	after	*23*	*17*	*7*	*9*	*56*
diesel	before	20	8	-	-	28
	after	-	*3*	-	-	*3*
total	before	169	24	12	56	261
	after	*30*	*20*	*7*	*24*	*81*

Table 2: Distribution of test vehicles with respect to technology and type of choice, and number of vehicles tested again after maintenance.

All the tested vehicles are differentiated between conventional gasoline vehicles (usually without any catalyst and sometimes with an oxidation catalyst), gasoline vehicles equipped with a 3-way catalyst, and diesel vehicles (without catalyst, but with an oxidation catalyst for one vehicle). The number of tested vehicles with respect to technology and choice type is presented in table 2, together with the number of maintained vehicles. Therefore 204 vehicles have been tested, i.e. 14 conventional gasoline ones, 162 3-way catalyst equipped one, and 28 diesel vehicles.

The tested vehicles are listed in annex 7, with their main characteristics and the number of each type of tests performed. In addition the distributions of engine capacity, maximum power, mileage are presented respectively in table 3, 4 and 5, for the whole sample and for the vehicles randomly chosen. In addition the number of vehicles tested by each laboratory is given in table 6.

(engine capacity)	veh. choice	< 1.4 l	1.4 - 2 l	2 l
conventional gasoline	all	22	19	-
	random	*6*	*8*	-
gas. 3-way catalyst	all	62	110	24
	random	*45*	*77*	*17*
diesel	all	-	23	5
	random	-	*15*	*5*
total	all	84	152	29
	random	*51*	*100*	*22*

Table 3: Distribution of test vehicles with respect to technology and engine capacity, for the whole sample and the vehicles randomly chosen.

(power)	veh. choice	<40	40-50	50-60	60-70	70-80	80-100	>100
conventional gasoline	all	7	5	13	12	0	3	1
	random	*3*	*1*	*3*	*6*	-	-	*1*
gas. 3-way catalyst	all	26	17	43	41	15	35	19
	random	*20*	*11*	*34*	*25*	*7*	*27*	*15*
diesel	all	5	7	11	4	1	-	-
	random	*2*	*5*	*9*	*3*	*1*	-	-
total	all	38	29	67	69	6	38	20
	random	*25*	*19*	*46*	*34*	*8*	*27*	*16*

Table 4: Distribution of test vehicles with respect to technology and power (kW), for the whole sample and the vehicles randomly chosen.

(mileage)	veh. choice	<20	20-40	40-60	60-80	80-100	100-150	>150
conventional gasoline	all	-	4	6	8	9	9	4
	random	-	*3*	*2*	*3*	*3*	*2*	-
gas. 3-w catalyst	all	27	48	45	37	11	20	8
	random	*26*	*40*	*32*	*25*	*5*	*7*	*4*
diesel	all	5	2	3	2	3	7	6
	random	*5*	*2*	*3*	*1*	*2*	*5*	*2*
total	all	32	54	54	47	23	26	18
	random	*31*	*45*	*37*	*29*	*10*	*14*	*6*

Table 5: Distribution of test vehicles with respect to technology and mileage (1000 km), for the whole sample and the vehicles randomly chosen.

(laboratory)	veh. choice	TNO	TÜV	INRETS	LAT	TRL
conventional gasoline	all	1	-	19	6	15
	random	-	-	*10*	*4*	
gas. 3-w catalyst	all	56	56	16	63	5
	random	*29*	*40*	*15*	*55*	
diesel	all	-	13	15	-	
	random	-	*5*	*15*	-	
total	all	57	69	50	69	20
	random	*29*	*45*	*40*	*59*	

Table 6: Distribution of test vehicles with respect to technology and laboratory, for the whole sample and the vehicles randomly chosen.

1.3. Data file

The vehicle and test parameters are recorded by each laboratory after local checking to eliminate possible errors or mistakes. Then the files are sent to the laboratory in charge of the data processing. The list of the provided parameters is given in annex 5. The data are then checked again to avoid transmission mistakes, mainly by comparing averages per laboratory for the randomly chosen vehicles and therefore by checking especially small or high figures.

In addition from the vehicle parameters and the data of each individual test, some new parameters are calculated:

- the vehicle age,
- the actual emissions on standard cycle rated by emission standard, i.e. the excess rate of emission standard for CO, HC and NOx or HC + NOx, particulates,
- the actual emissions on the four long modem IM cycles, weighted by the percentage of distance driven in the real world for each of them (see these percentages Tab. 1),
- the sum of HC and NOx emissions in g/km for the short tests,
- the sum of HC and NOx raw average concentrations for the short tests.

The list of parameters is presented in annex 8 with their informatic names used later in the presentation of the results. All together more than 800 parameters are processed per vehicle.

2. Average figures

2.1. Average test conditions

The average values of the main technical characteristics of the test vehicles are presented in table 7, for the whole sample and only for the vehicles randomly chosen. We can observe that the randomly chosen conventional vehicles are slightly smaller than the vehicles chosen as high emitters and that the difference is not clear for the gasoline 3-way catalyst and the diesel vehicles.

		veh. choice	conventional gasoline	gas. 3-way catalyst	diesel
engine capacity	(cm^3)	All	1425	1655	1899
		random	*1437*	*1561*	*1781*
power	(kW)	all	56.7	68.5	52.0
		random	*58.3*	*68.6*	*47.5*
mass	(kg)	all	921	1047	1124
		random	*913*	*1053*	*1142*
mileage	(km)	all	94411	58707	97479
		random	*69783*	*66862*	*71429.33*
atmospheric pressure	Pa	All	1002.7	1010.6	1000.9
		Random	*997.3*	*1010.2*	*1006.2*
temperature	°C	All	22.1	22.1	20.3
		Random	*21.4*	*21.7*	*23.0*
humidity	%	All	47.4	53.4	37.4
		Random	*57.3*	*56.3*	*26.5*

Table 7 Average values of the main technical characteristics of test vehicles and of the environmental conditions, for the whole sample and the vehicles randomly chosen.

Tables 8, 9 and 10 illustrate main vehicle-related characteristics and cycle performance conditions in the involved laboratories for 3 engine types (catalyst, gasoline and diesel vehicles respectively). The results obtained correspond to average values covering all test vehicles and then only a portion of vehicles selected at random.

For catalyst vehicles (Table 8), discrepancies are observed between the various laboratories in terms of engine capacity, vehicle power and mass. The average values recorded by INRETS

and LAT are lower. Average mileage is very high for the TRL test vehicles (117 196 km) and relatively low for INRETS (25 044 km).

As regards cycle performance conditions, a great variation is noted in terms of moisture content between the involved laboratories. Other test conditions are quite similar.

For non-catalyst gasoline vehicles (Table 9), a relatively good agreement of the results is recorded between the laboratories.

Concerning diesel vehicles (Table 10), discrepancies are noted in terms of average mileage and moisture content between the laboratories.

For gas. 3-way catalyst	veh. choice	INRETS	LAT	TNO	TRL	TÜV
engine capacity (cm^3)	All	1436	1411	1839	1711	1803
	random	*1449*	*1400*	*2031*		*1793*
power (kW)	all	52.2	58.5	75.2	74.4	75.6
	random	*58.3*	*57.0*	*86.0*		*75.7*
mass (kg)	all	974	966	1110	1059	1096
	random	*986*	*960*	*1203*		*1096*
mileage (km)	all	25044	56247	68062	117196	56517
	random	*26213*	*53791*	*62871*		*42287*
atmospheric pressure Pa	All	992.6	1011.4	1014.8	1010.3	1010.6
	Random	*993.0*	*1011.7*	*1016.1*		*1010.2*
temperature °C	All	17.2	21.1	23.1	24.3	23.6
	Random	*17.0*	*20.6*	*23.4*		*23.8*
humidity %	All	40.7	67.0	52.7	33.2	44.4
	Random	*40.2*	*67.3*	*54.7*		*48.5*

Table 8 : Average values of the main technical characteristics of test vehicles and of the environmental conditions, for the whole sample and the vehicles randomly chosen grouping by laboratory and for gasoline 3 way catalyst.

For conventional gasoline		veh. choice	INRETS	LAT	TNO	TRL
engine capacity	(cm³)	All	1428	1390	1351	1440
		random	*1413*	*1498*		
power	(kW)	all	55.1	56.4	63.0	58.4
		random	*56.2*	*63.5*		
mass	(kg)	all	870	959	930	968
		random	*879*	*996*		
mileage	(km)	all	87275	97344	48354	105346
		random	*64300*	*83491*		
atmospheric pressure	Pa	All	993.7	1008.5	1017.0	1010.8
		Random	*992.1*	*1010.3*		
Temperature	°C	All	20.3	22.2	21.6	24.3
		Random	*22.0*	*20.0*		
Humidity	%	All	53.1	70.5	55.9	30.5
		Random	*53.4*	*67.0*		

Table 9 : Average values of the main technical characteristics of test vehicles and of the environmental conditions , for the whole sample and the vehicles randomly chosen by laboratory and for conventional gasoline.

For gas. 3-way catalyst		veh. choice	INRETS	TÜV
engine capacity	(cm³)	All	1839	1969
		random		*1781*
power	(kW)	all	51.7	52.4
		random		*47.5*
mass	(kg)	all	1074	1181
		random		*1142*
mileage	(km)	all	57467	143647
		random		*142933*
Atmospherique Pressure	Pa	All	995.1	1007.7
		Random		*1006.2*
Temperature	°C	All	17.9	23.1
		Random		*23.0*
Humidity	%	All	48.2	25.0
		Random		*26.5*

Table 10 : Average values of the main technical characteristics of test vehicles, for the whole sample and the vehicles randomly chosen by laboratory and for diesel .

2.2. Emissions per vehicle type

The following diagrams show average emissions versus speed for each studied cycle and pollutant (Figures 2 for catalyst vehicles, 5 for non-catalyst vehicles and 8 for diesel vehicles).

Figures 3. 6 and 9 illustrate the maintenance influence for the three engine types, over the standardised and modem weighted cycles.

For catalyst vehicles and diesel vehicles (Figures 3 and 9):

Post maintenance emissions are most of the time higher than those of non-maintained vehicles. CO2 emissions are higher after maintenance operations. Concerning the other pollutant studied a significant decrease in emissions after maintenance is nevertheless recorded.

For non-catalyst vehicles (Figure 6), excepting CO2, a significant decrease in emissions after maintenance is observed. Most of the time these are lower than those recorded for non-maintained vehicles.

Figures 4, 5 and 10 illustrate the influence of the selection mode (random or non-random) for the three engine types over the standardised and modem weighted cycles.

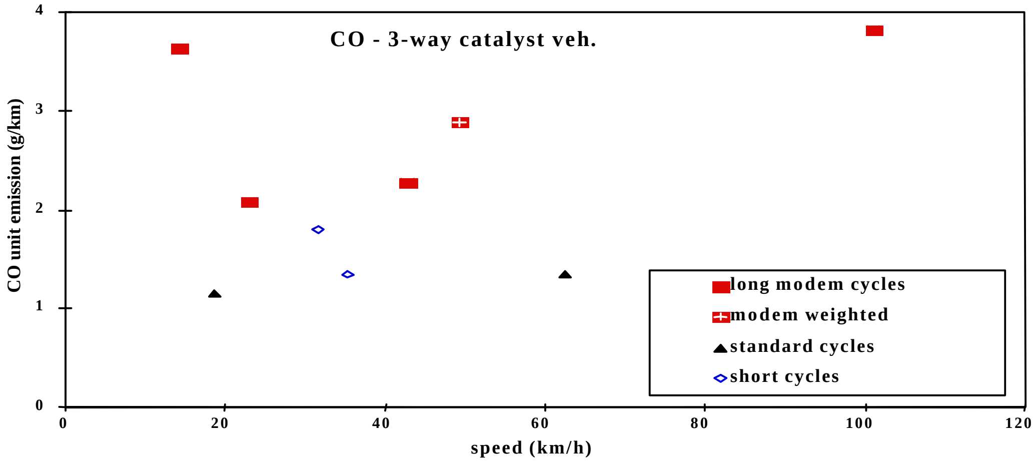
As regards catalyst vehicles (Figure 4), the recorded emissions for vehicles selected at random are significantly lower than those obtained for high-polluting vehicles, except for CO2 emissions and fuel consumption.

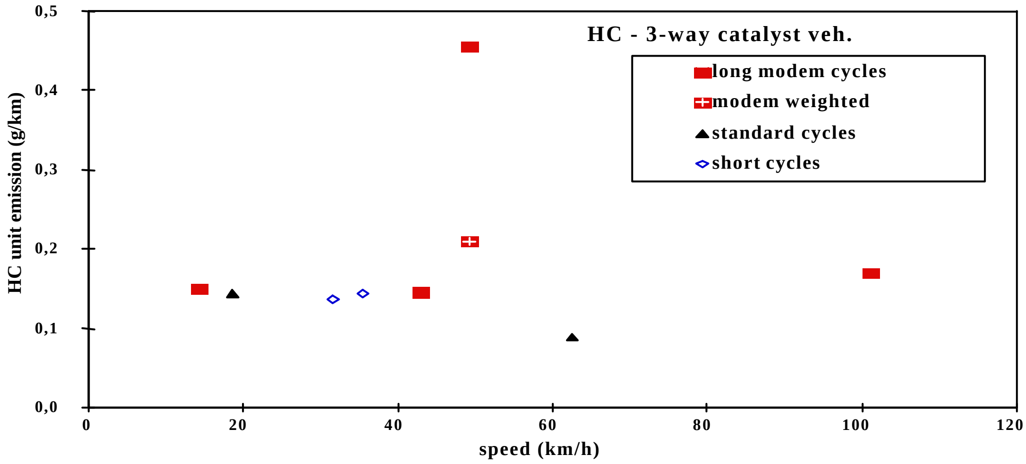
Concerning non-catalyst vehicles (Figure 7), the differences recorded between the randomly selected vehicles and the vehicles selected as high polluters are relatively low**.** For the modem-weighted cycle HC, NOx and CO emissions are higher for the randomly selected vehicles.

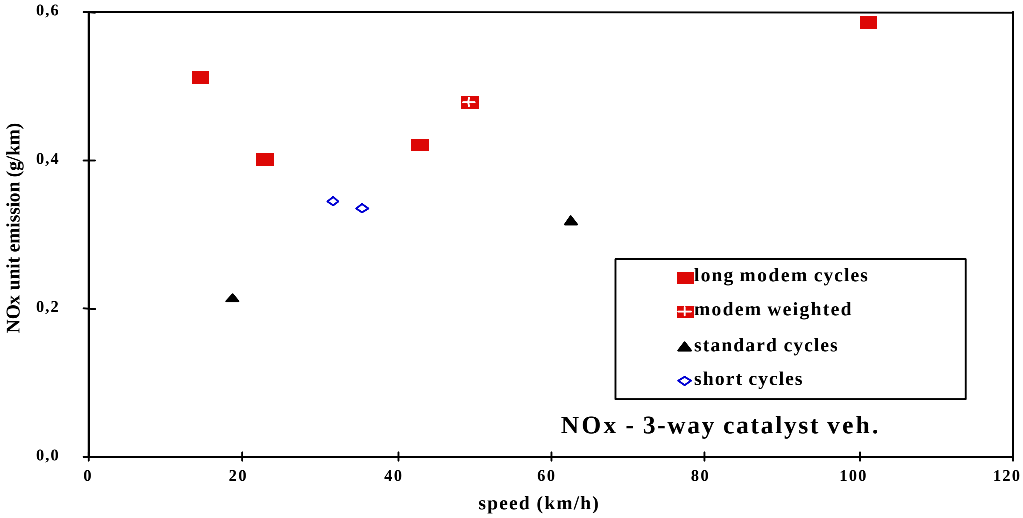
For diesel vehicles (Figure 10), very significant differences are noted between the vehicle selection modes. All emissions recorded for randomly selected vehicles are lower than those noted for high polluters.

2.2.1 Emissions for gasoline 3-way catalyst vehicles

Cycle type influence on emissions







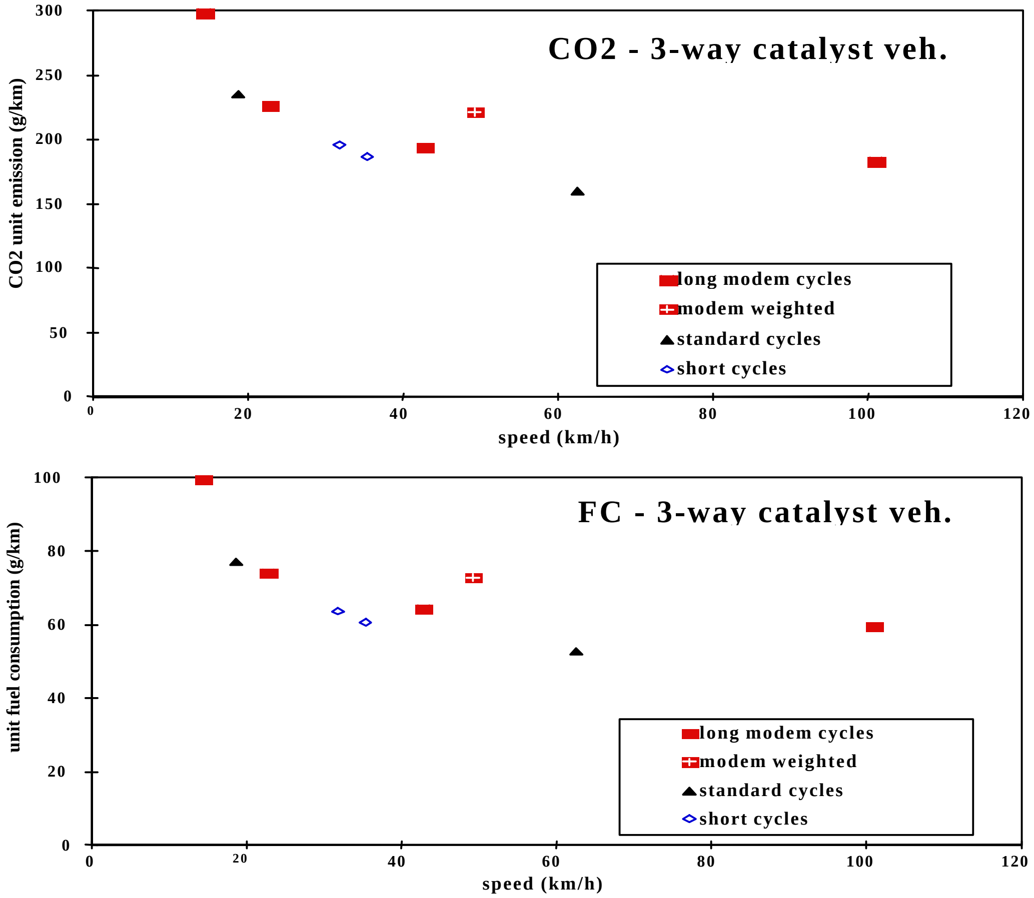
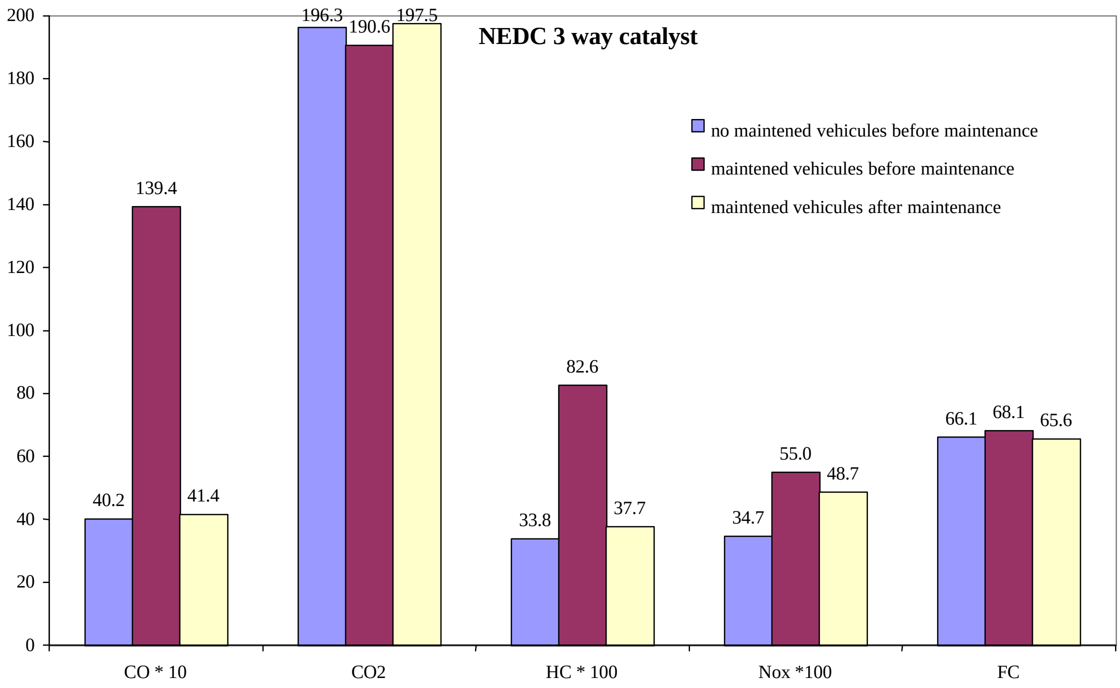


Figure 2 : Average unit emissions for 3-way catalyst petrol vehicles versus average speed for actual, standard and short driving cycles.

Maintenance influence on emissions



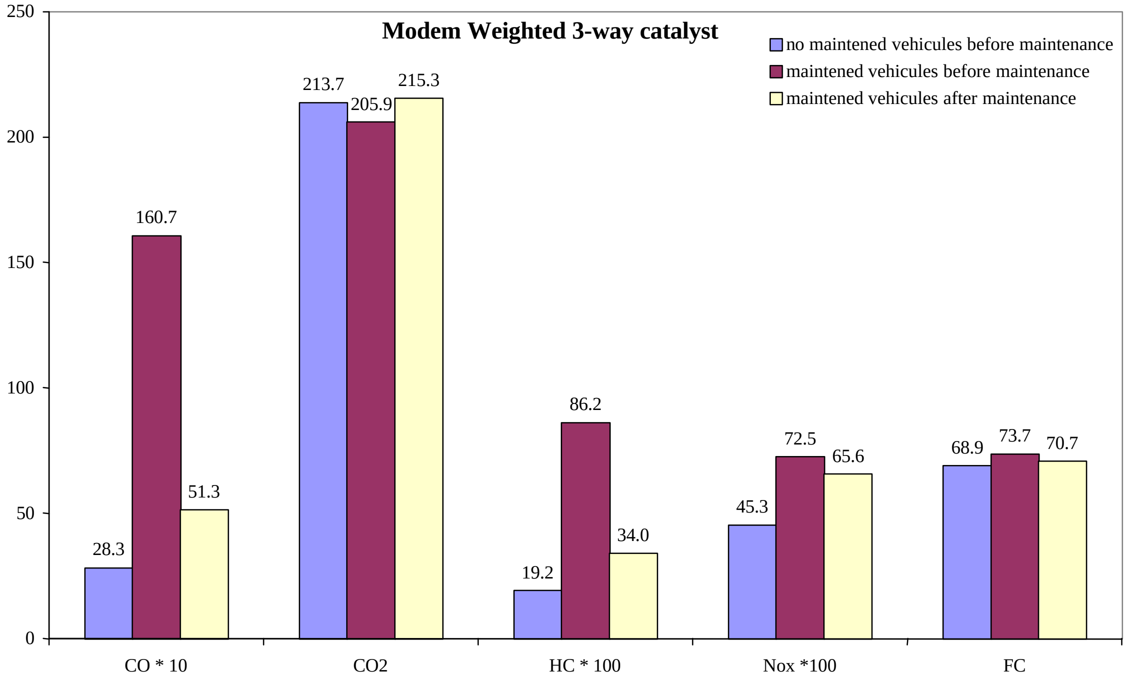
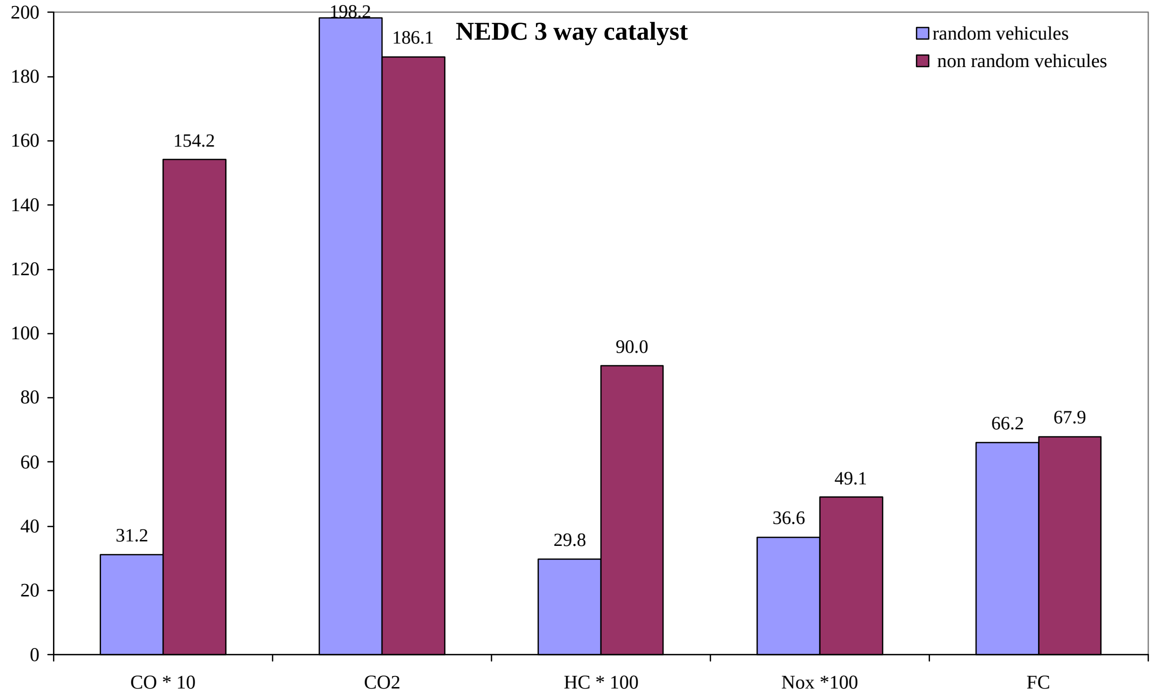


Figure 3 : Maintenance influence for 3-way catalyst petrol vehicles

Vehicle selection model influence on emissions



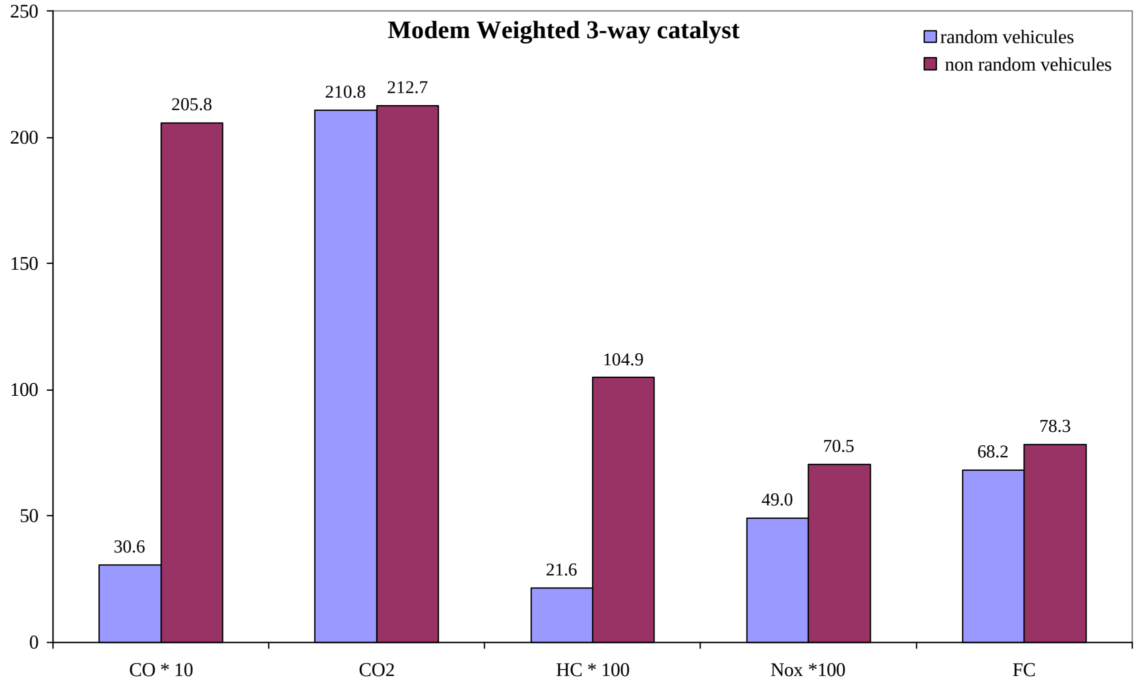
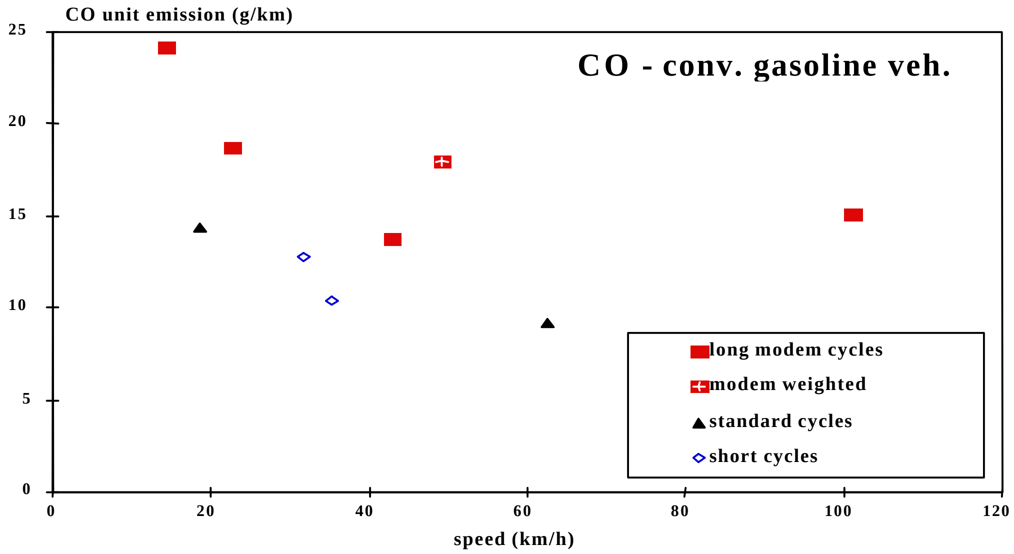
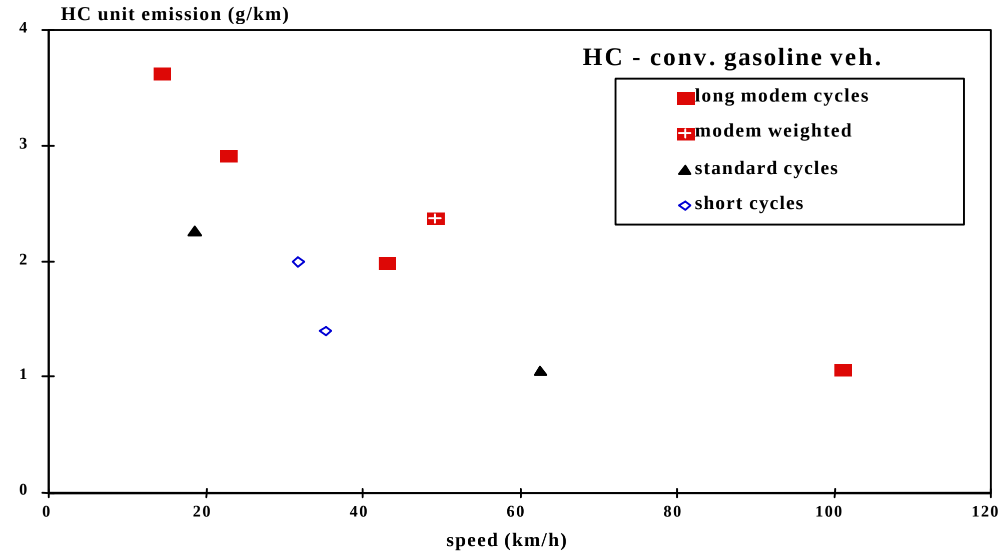


Figure 4 : Influence of the catalyst vehicle selection mode on average emissions, for NEDC et modem weighted cycles

2.2.2 Emissions for conventional gasoline vehicles

Comparison between cycles





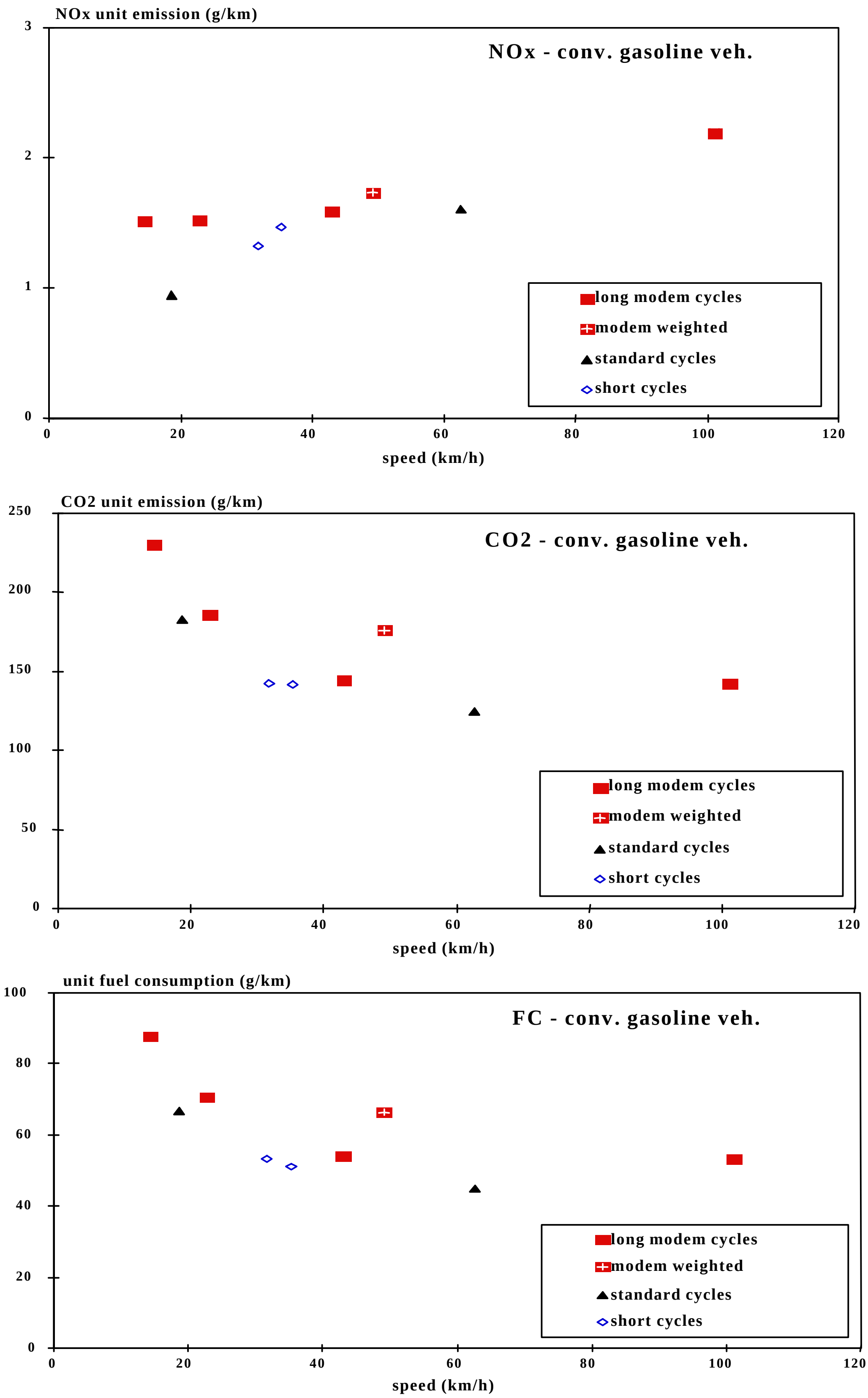
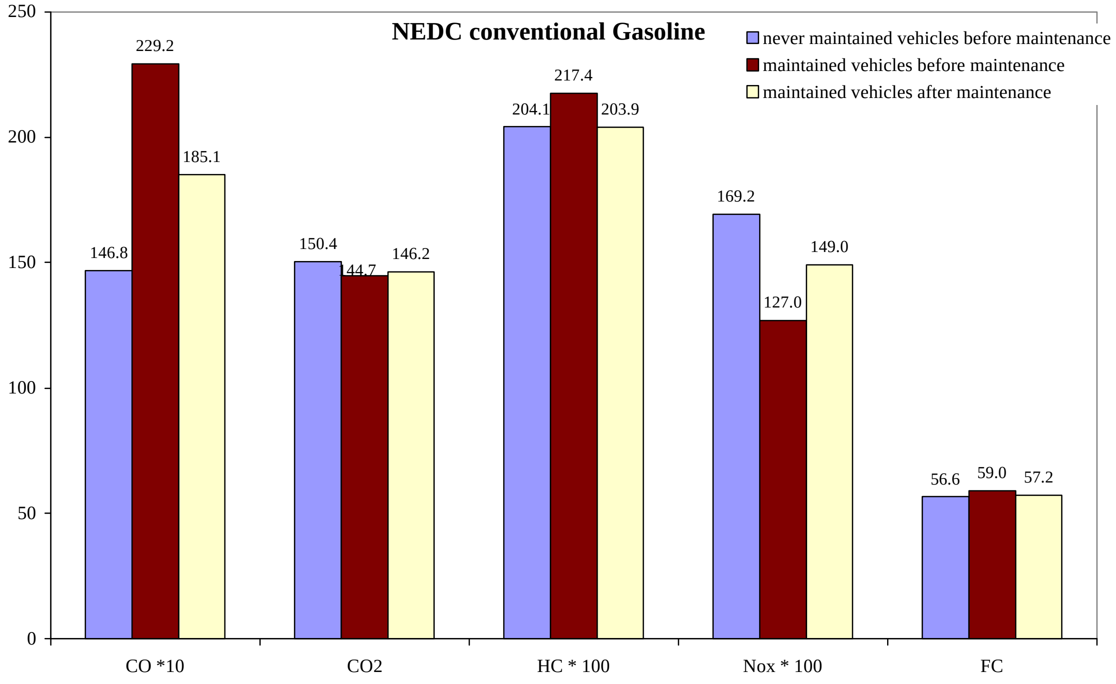


Figure 5 : Average unit emissions for conventional petrol vehicles versus average speed for actual, standard and short driving cycles.

Maintenance influence on emissions



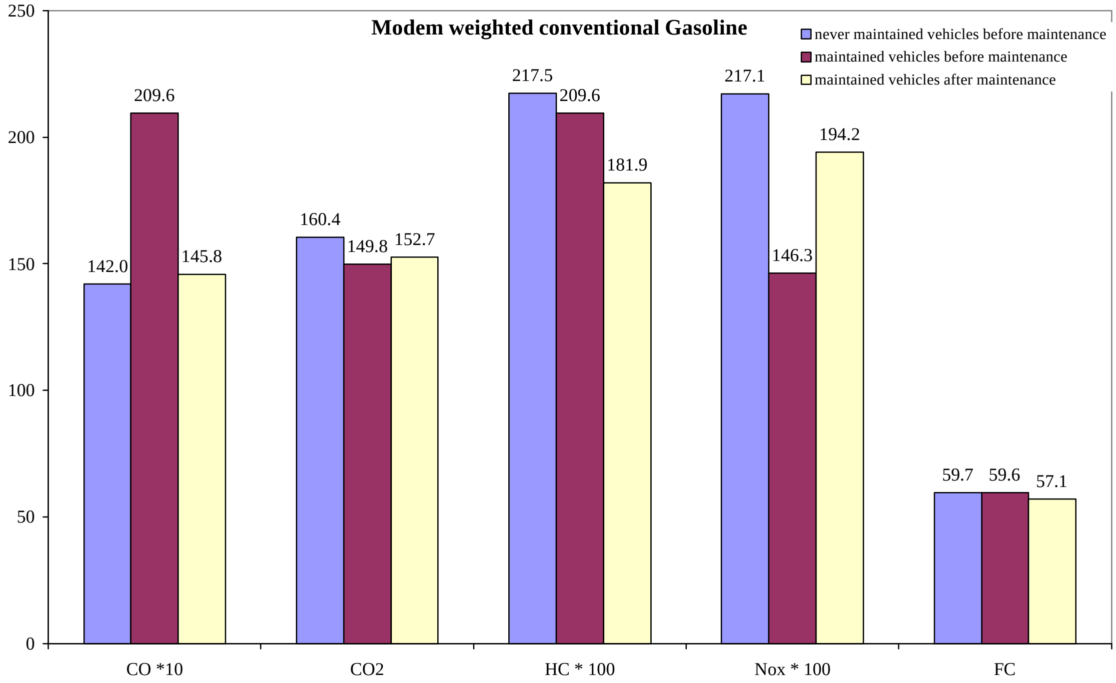
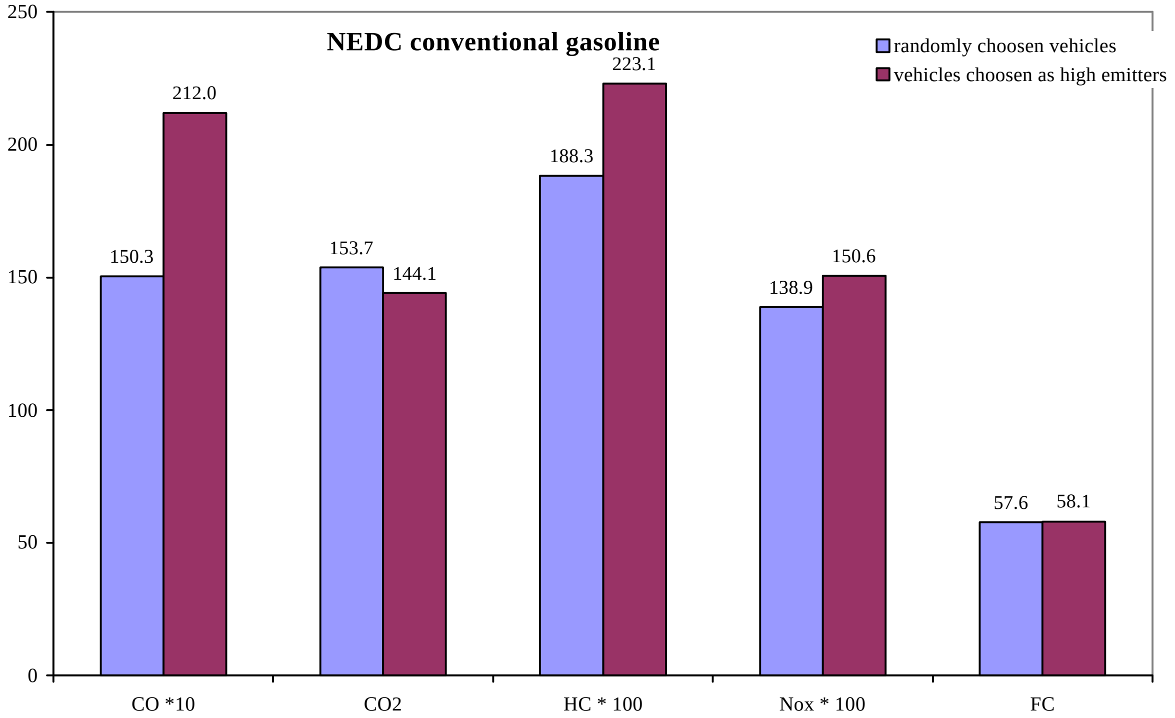


Figure 6: Maintenance influence for conventional petrol vehicles

Vehicle selection model influence on emissions



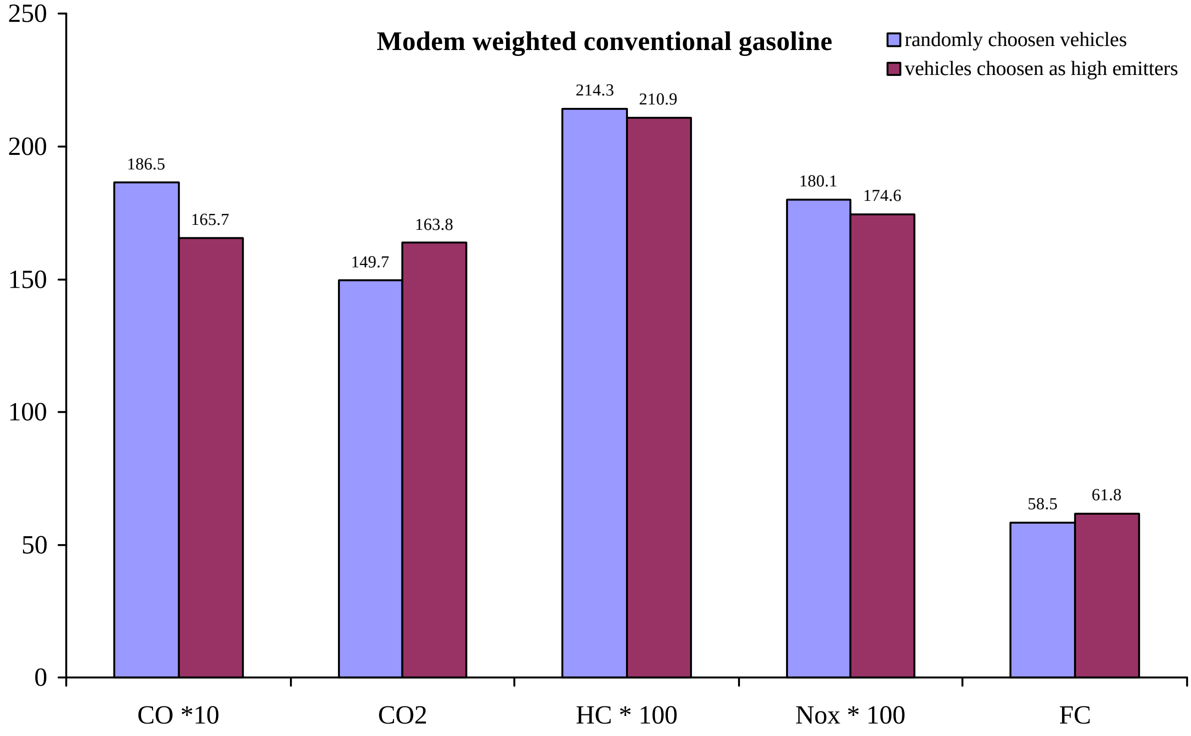
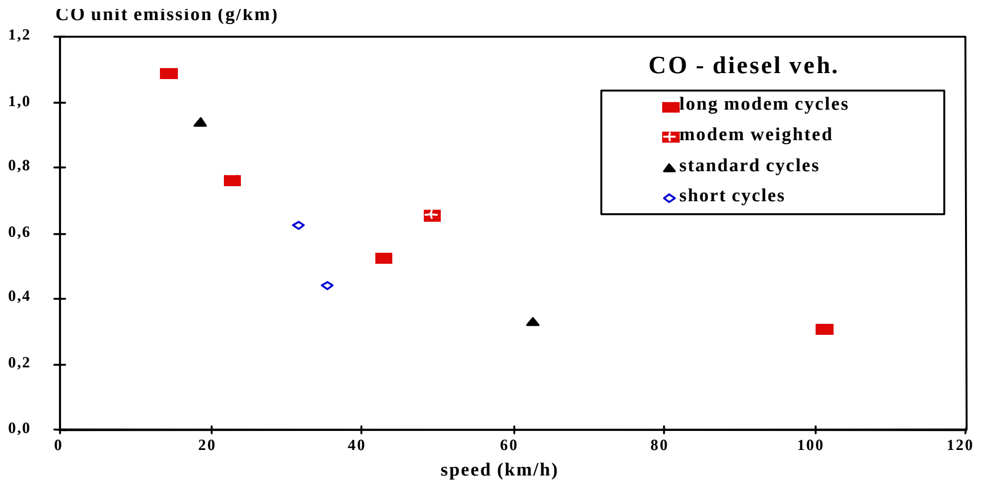
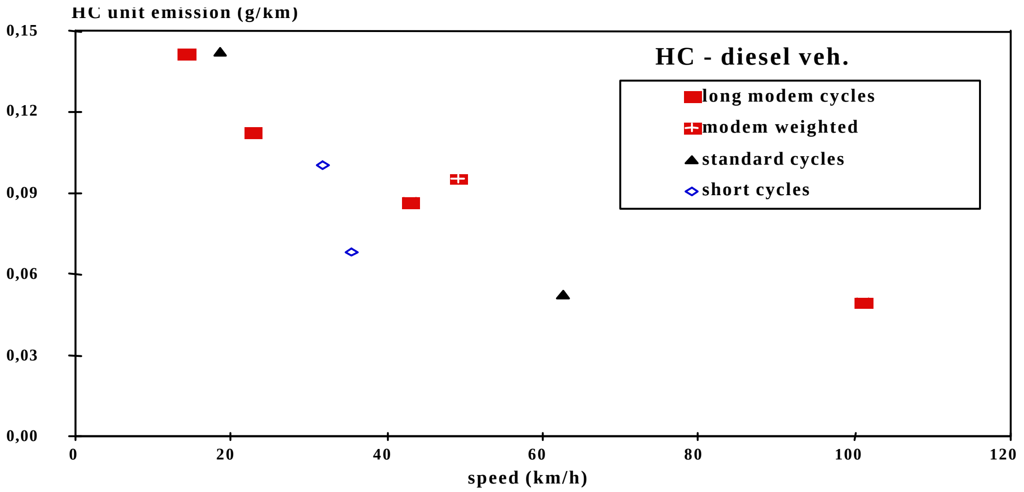


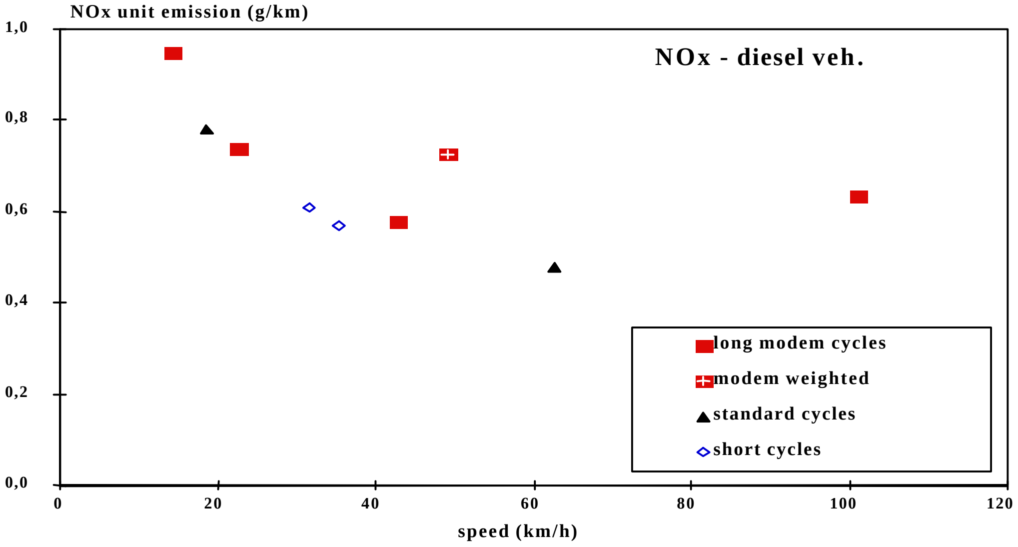
Figure 7: Influence of the non catalyst vehicle selection mode on emissions

2.2.3 Emissions of diesel vehicles

Comparison between cycles







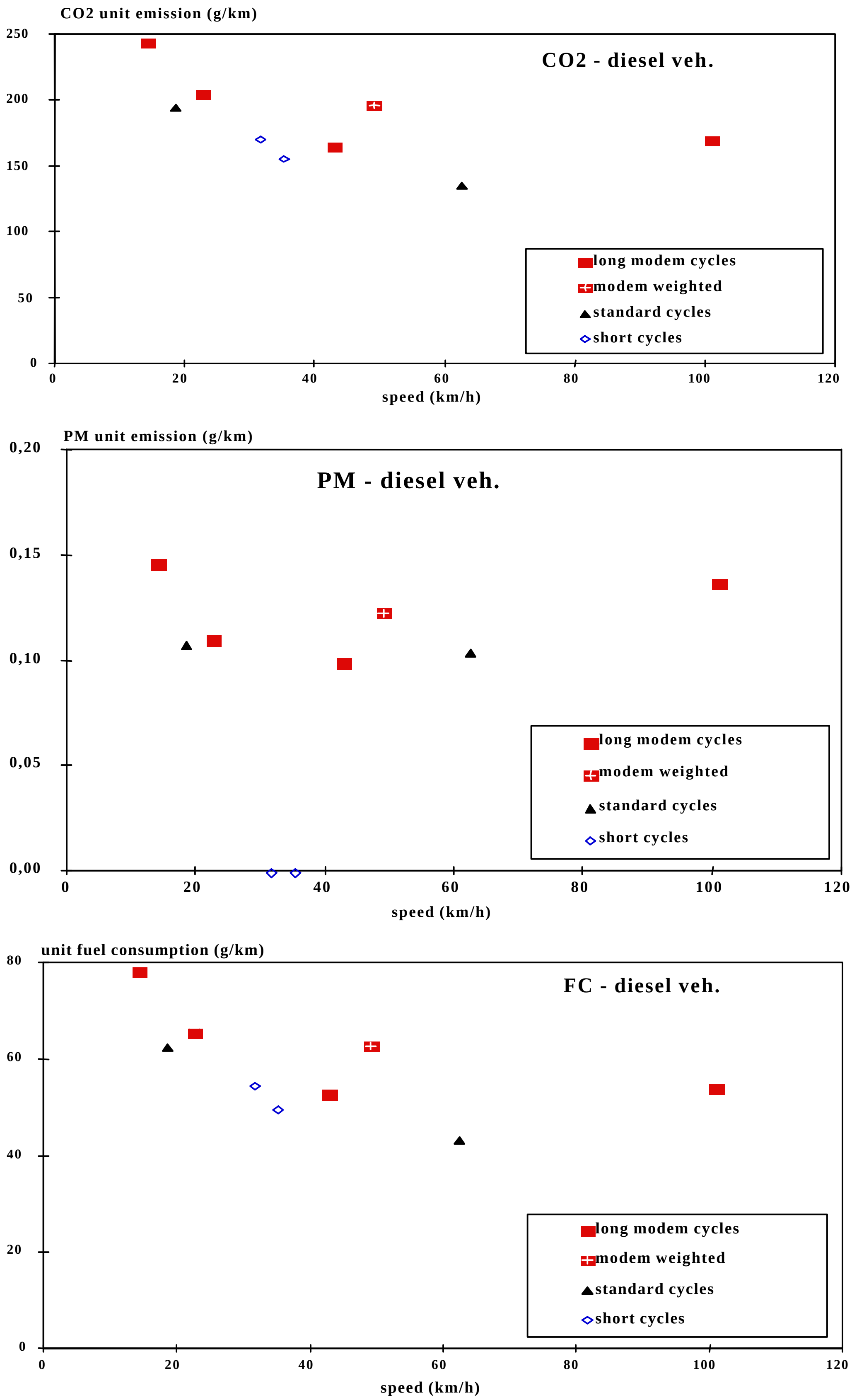
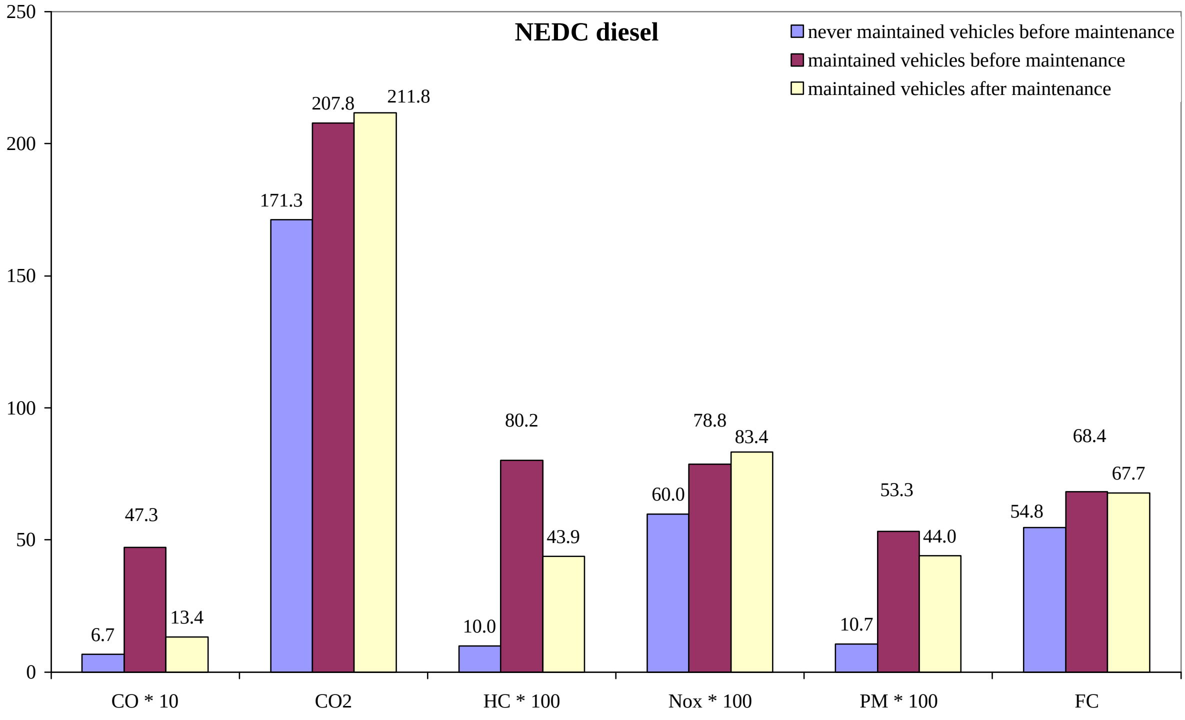


Figure 8: Average unit emissions for diesel vehicles versus average speed for actual, standard and short driving cycles.

Maintenance influence on emissions



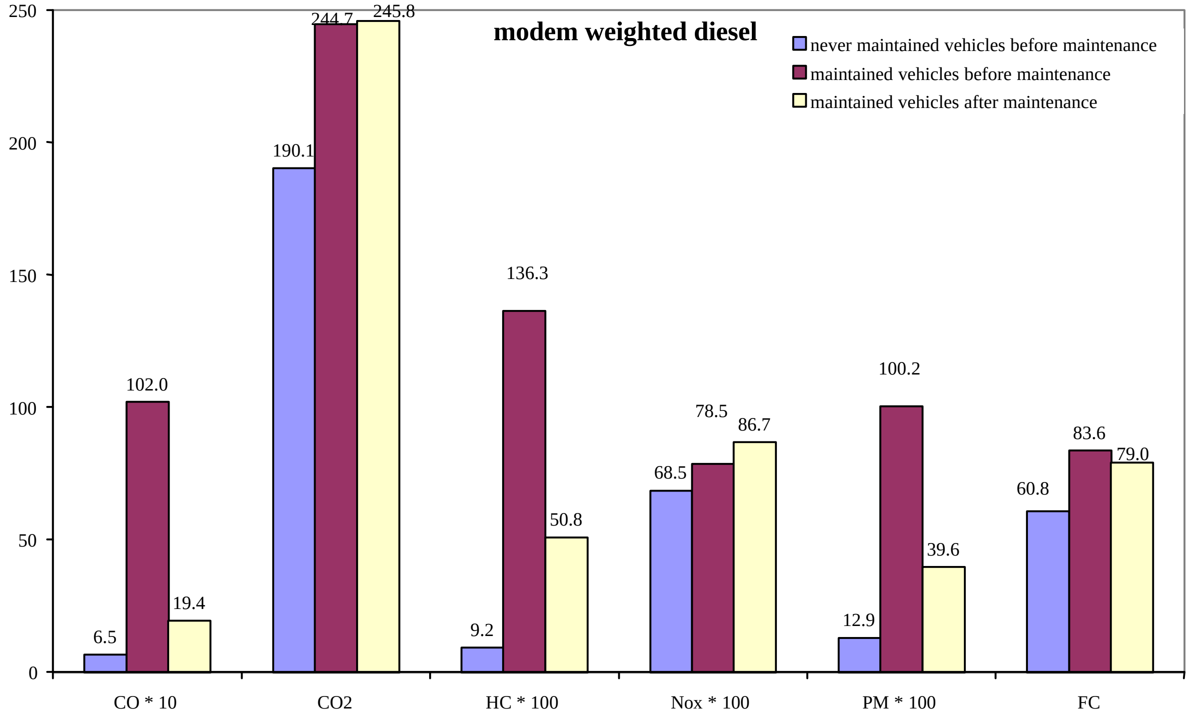
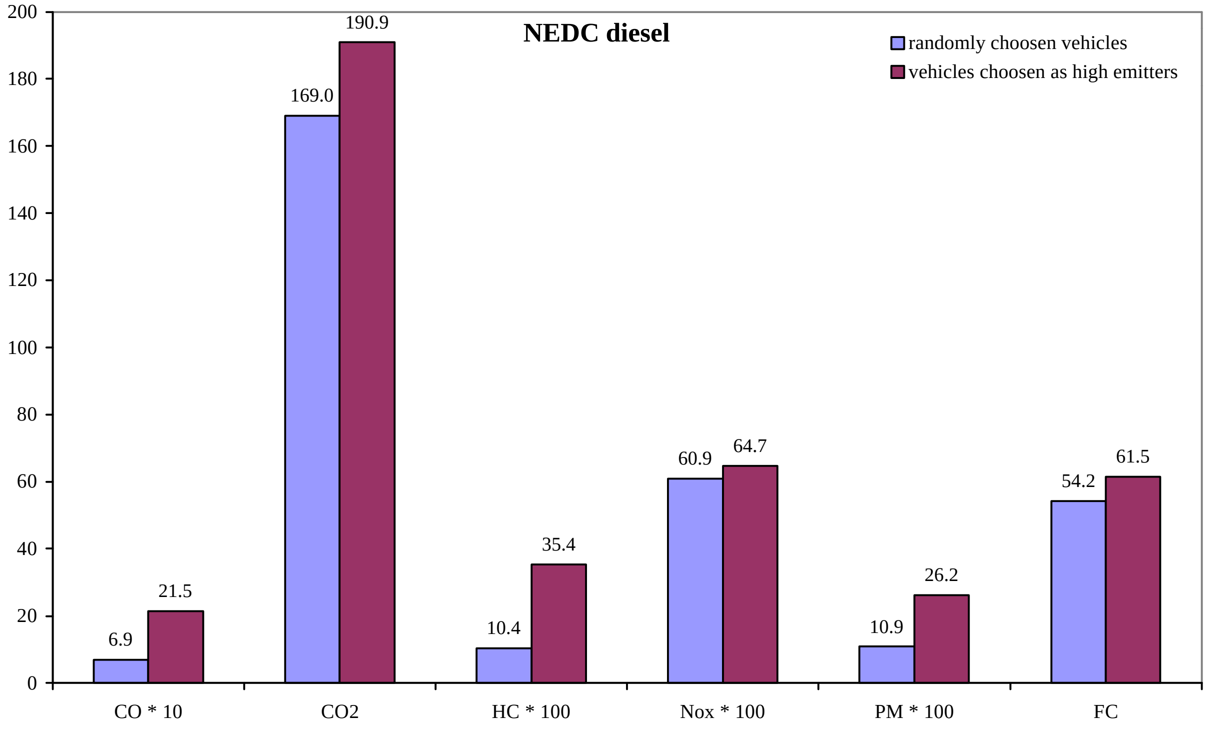


Figure 9 : Maintenance influence for diesel vehicles

Vehicle selection model influence on emissions



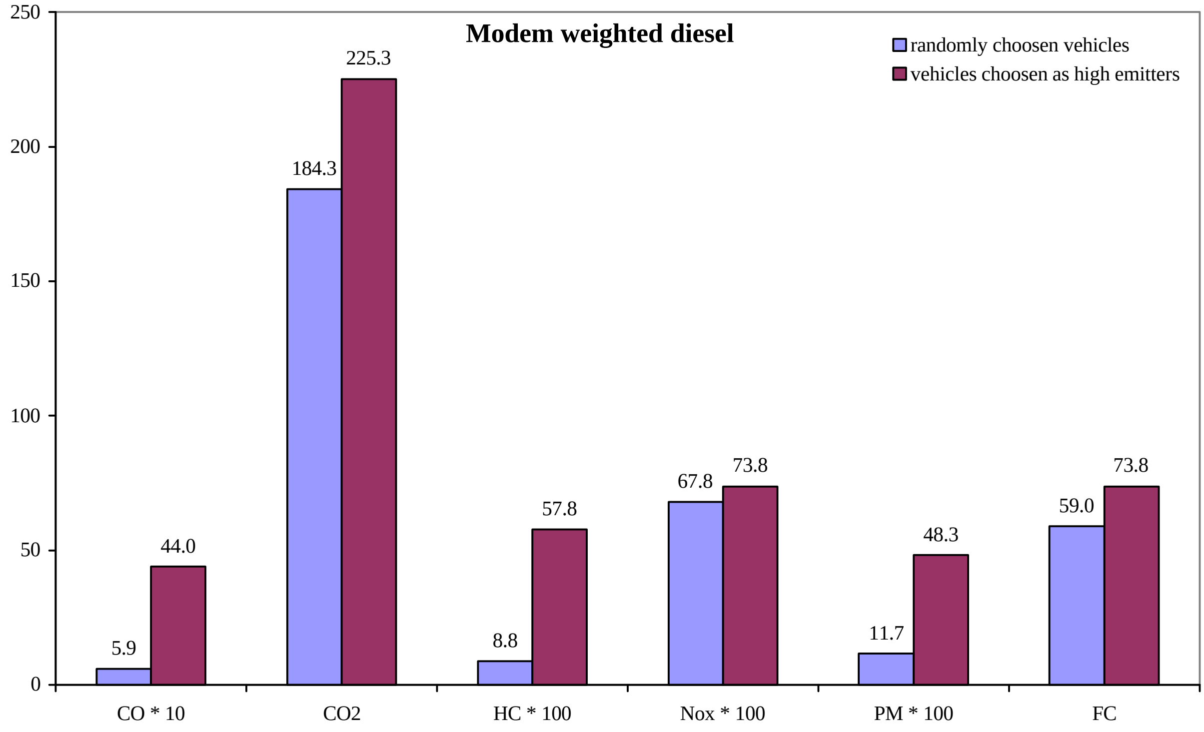


Figure 10 : Choice influence for diesel vehicles

3. Relationships between parameters

3.1. Correlation coefficients

Correlation coefficients were calculated for randomly selected vehicles only. The results recorded are given in Appendix 9 for catalyst vehicles, Appendix 10 for non-catalyst vehicles and in Appendix 11 for diesel vehicles. The main results obtained are given below.

As concerns catalyst vehicles, best correlations are observed between CO2 emissions and fuel consumption for each cycle and mass, power and engine capacity. The other variables have no significant impact (Figures 11 and 12).

For non-catalyst and diesel vehicles, a good correlation is noted between emissions and vehicle parameters, but the number of test vehicles in each box is too low to determine a significant relationship between them (Figure 15).

As for catalyst vehicles, the best significant correlations are recorded between CO2 emissions and fuel consumption and power, mass and engine capacity (Figures 16 and 17). This result is similar for diesel vehicles.

For catalyst vehicles:

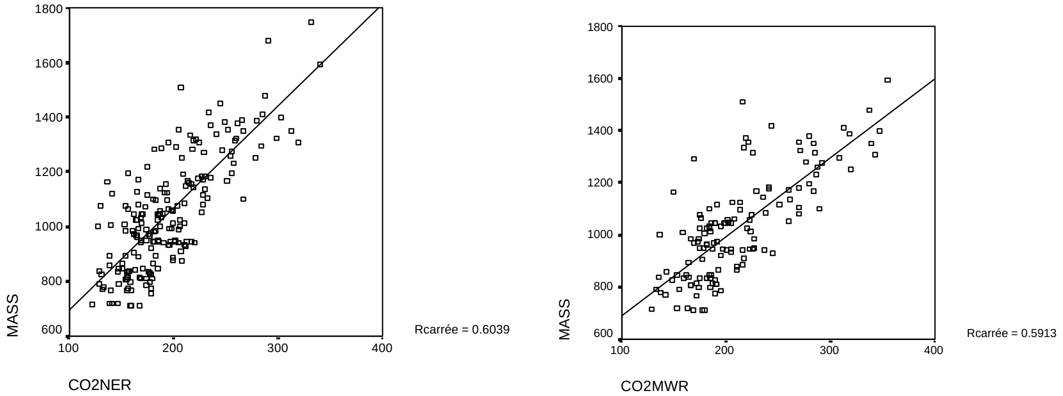


Figure 11 : correlation between CO2 emissions and mass for catalyst vehicles selected at random

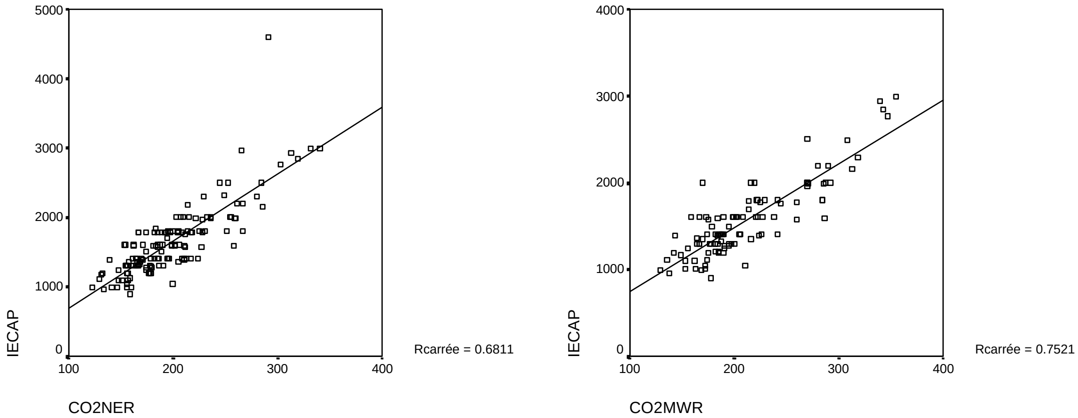


Figure 12 : correlation between CO2 emissions and engine capacity for catalyst vehicles selected at random

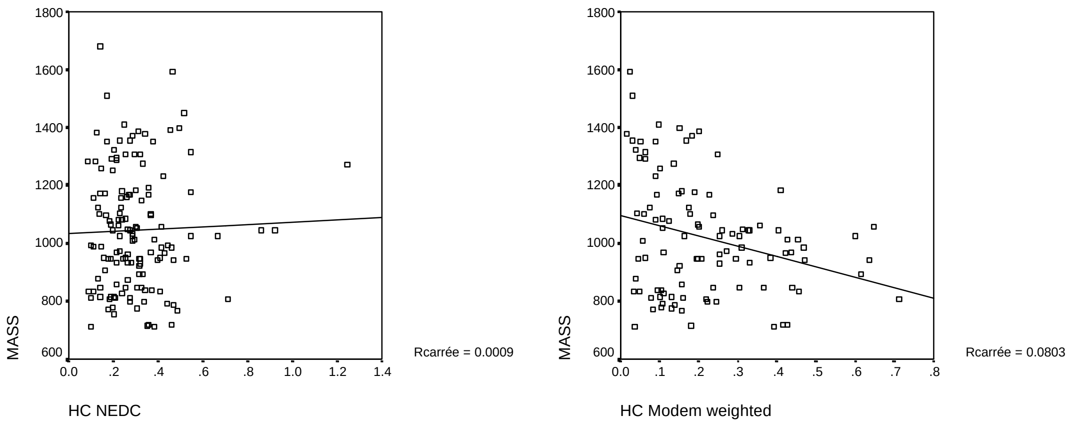


Figure 13 : correlation between hydrocarbon emissions and mass for catalyst vehicles selected at random

Figure 13 shows that the relationship between the vehicle characteristics and emissions is not significant for all the studied pollutants.

For non-catalyst vehicles:

Measurement conditions are linked between each other, as illustrated in Figure 14 below:

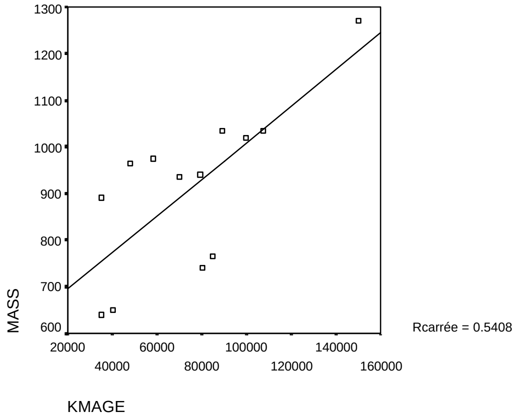


Figure 14 : Correlation between measurement conditions for non-catalyst vehicles selected at random

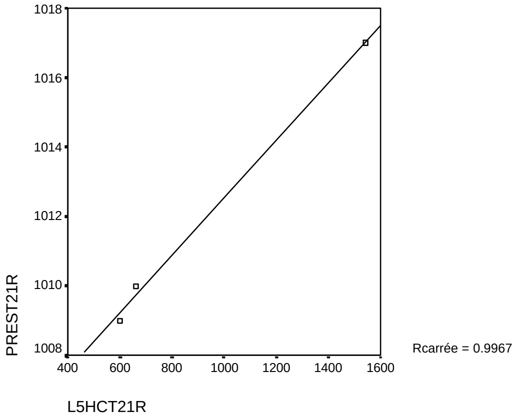


Figure 15 : an example of good correlation, but recorded from a small sample of non-catalyst vehicles selected at random

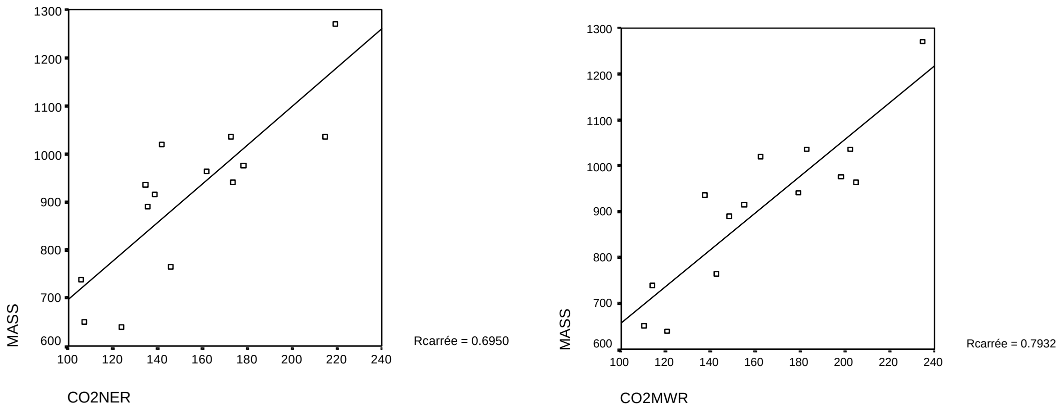


Figure 16 : correlation between CO2 emissions and mass of non-catalyst vehicles selected at random

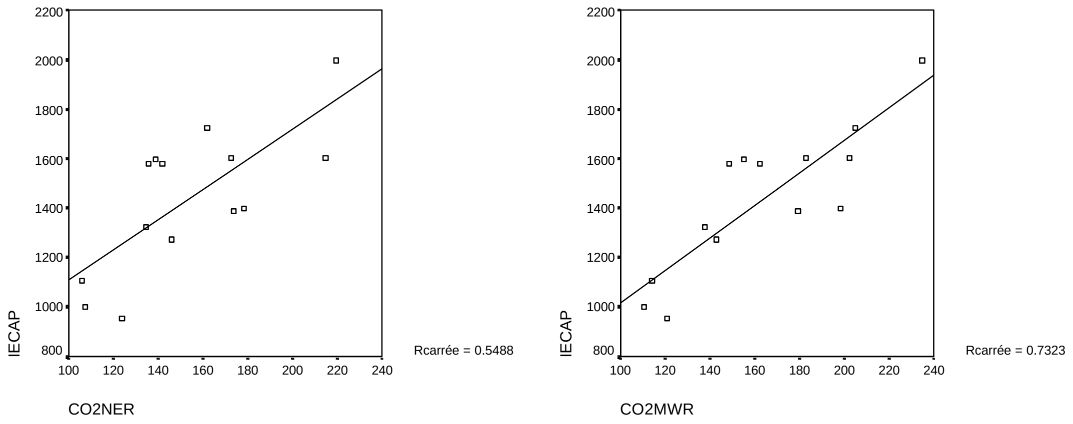


Figure 17 : correlation between CO2 emissions and engine capacity for non-catalyst vehicles selected at random

For diesels vehicles

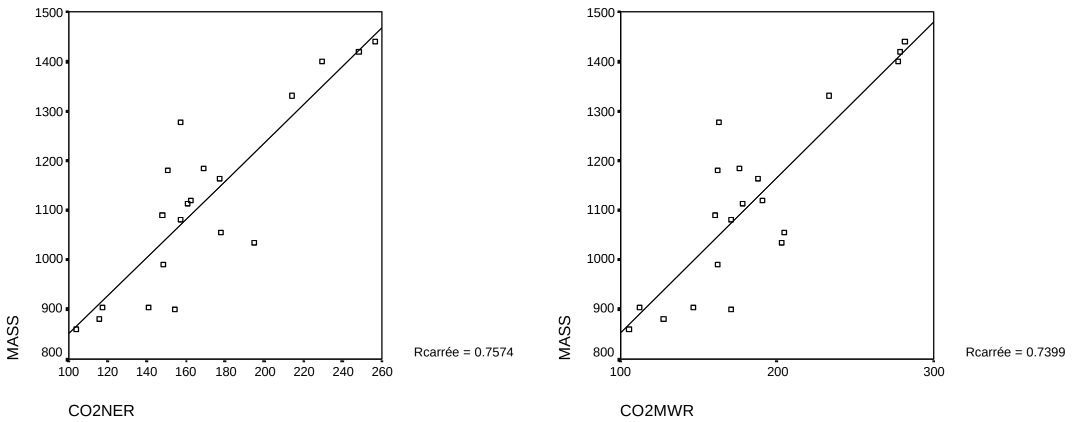


Figure 18 : correlation between CO2 emissions and mass for diesel vehicles selected at random

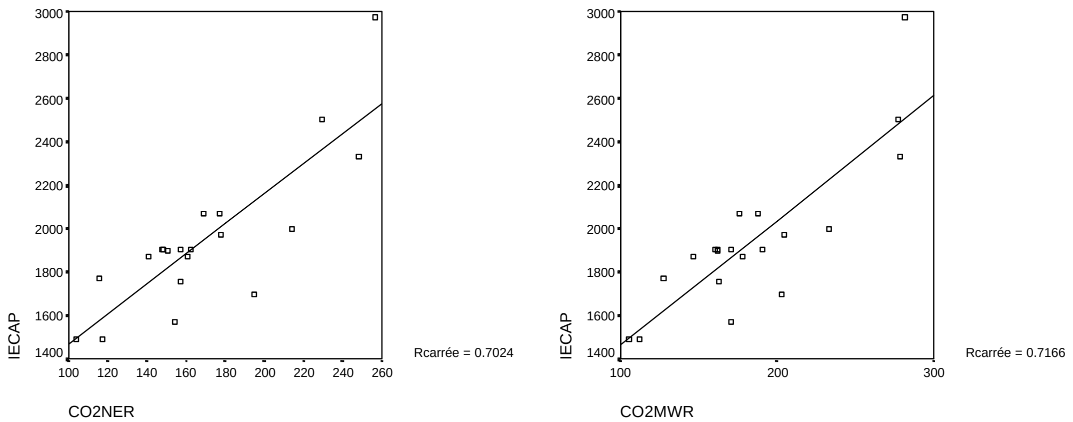
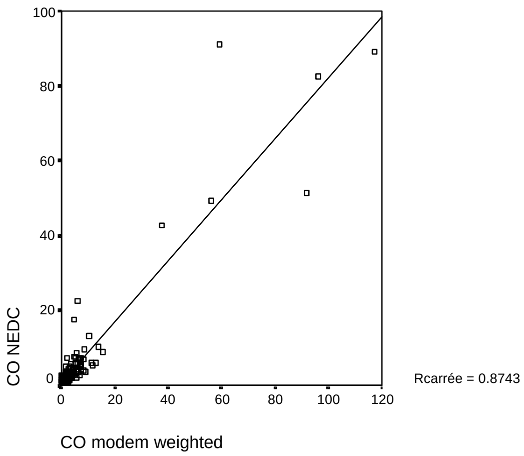


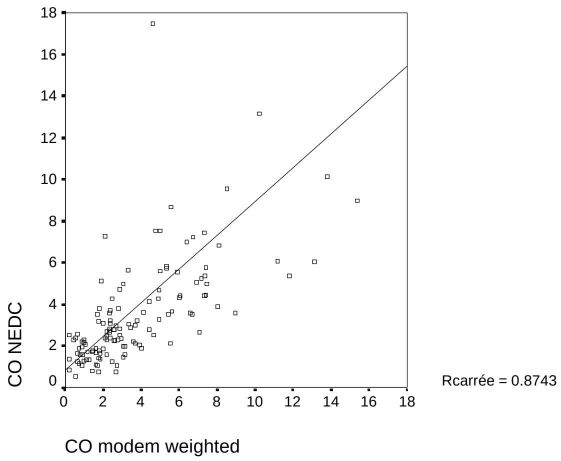
Figure 19 : correlation between CO2 emissions and engine capacity for diesel vehicles selected at random

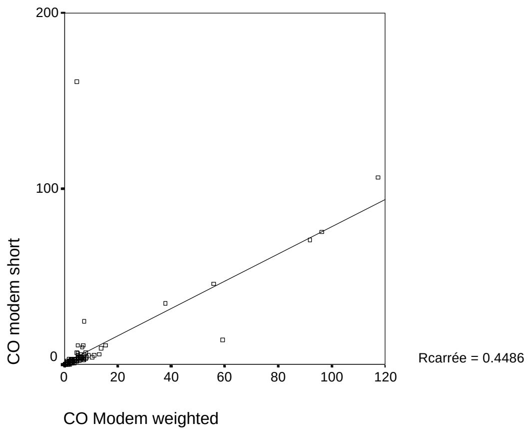
3.2. Relationships between standard, actual and short tests

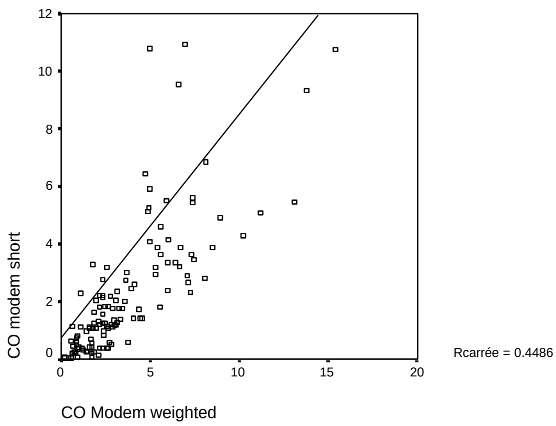
The relationships between measured emissions for various cycles or test conditions are presented below for all the test vehicles, independently of the selection mode.

3.2.1. Relationship for gasoline 3 way calalyst vehicles









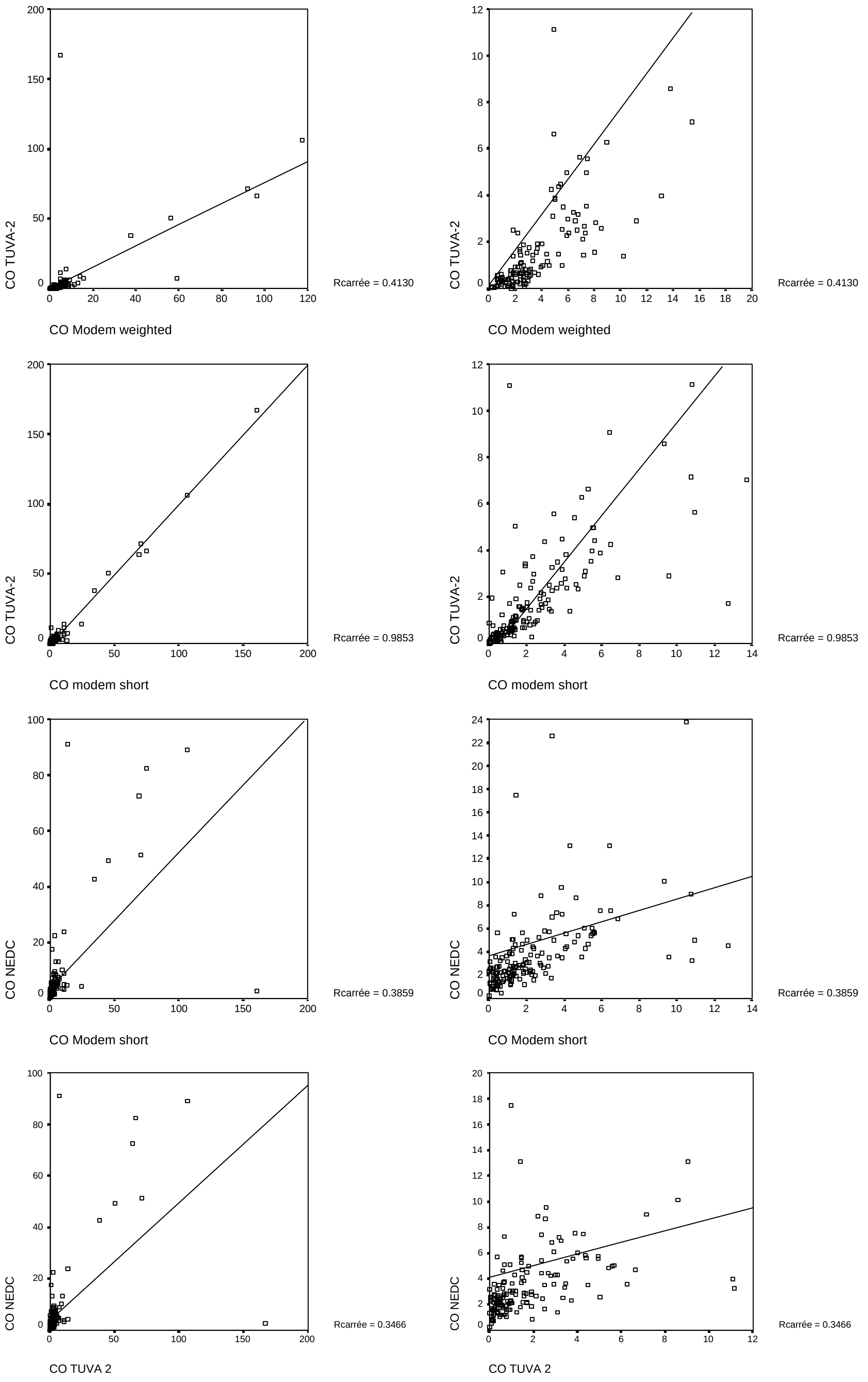


Figure 20 : CO emissions for each vehicle according to NEDC, modem weighted, TÜVA-2 and modem short cycles, compared to each other for catalyst vehicles

There is a very good correlation between the standard NEDC and the modem weighted cycles, and between the TÜVA-2 and modem short cycles.

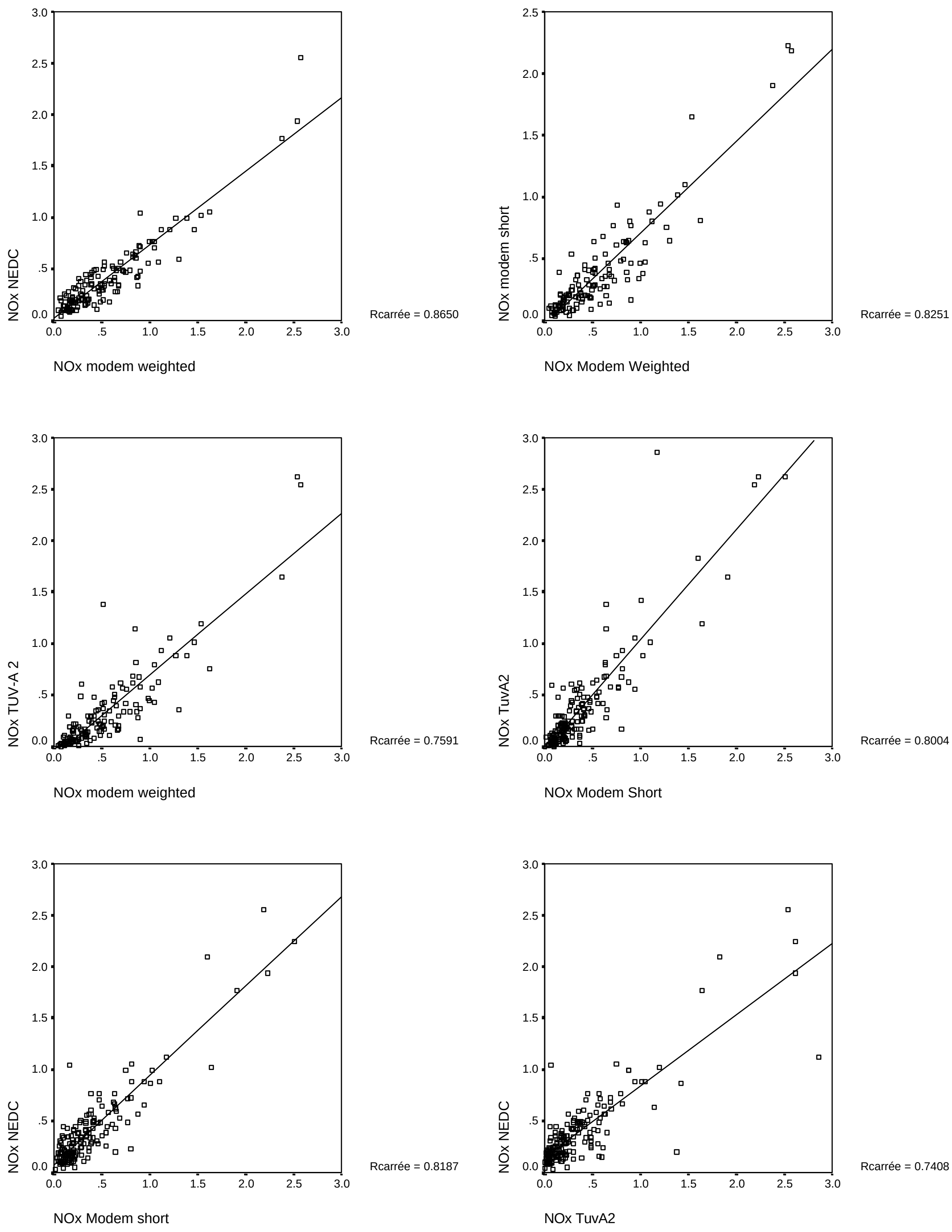


Figure 21 : NOx emissions, for each vehicle, according to NEDC, modem weighted, TÜVA-2 and modem short cycles, compared to each other for catalyst vehicles.

There is a good correlation between all the represented cycles.

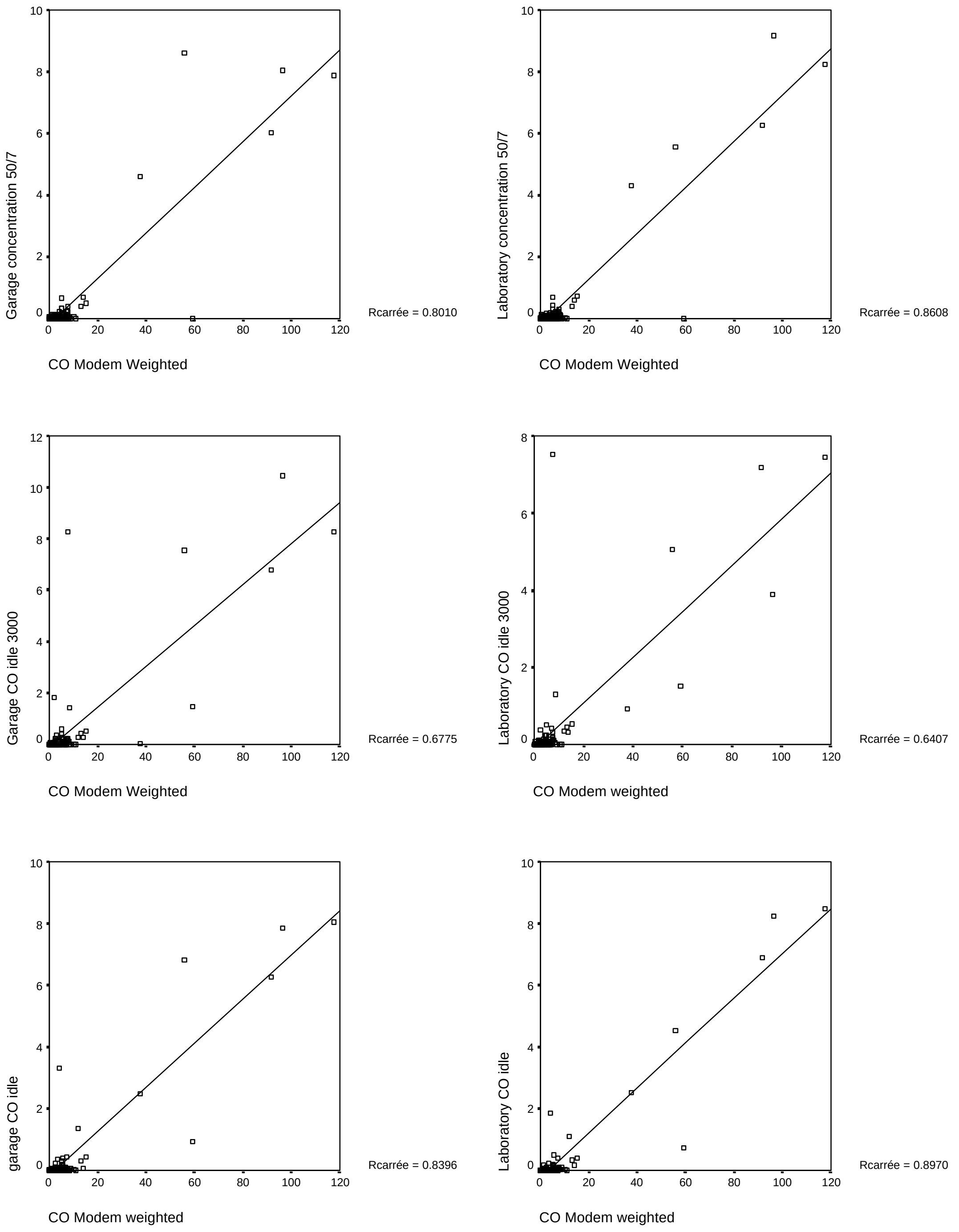


Figure 22 : correlation between CO concentrations for 50/7, idle and idle 3000 cycles versus CO emissions for the modem weighted, cycle, comparing garage and laboratory analysers.

There is a good correlation between modem weighted and idle cycles, and between modem weighted and 50/7 cycles for CO2.

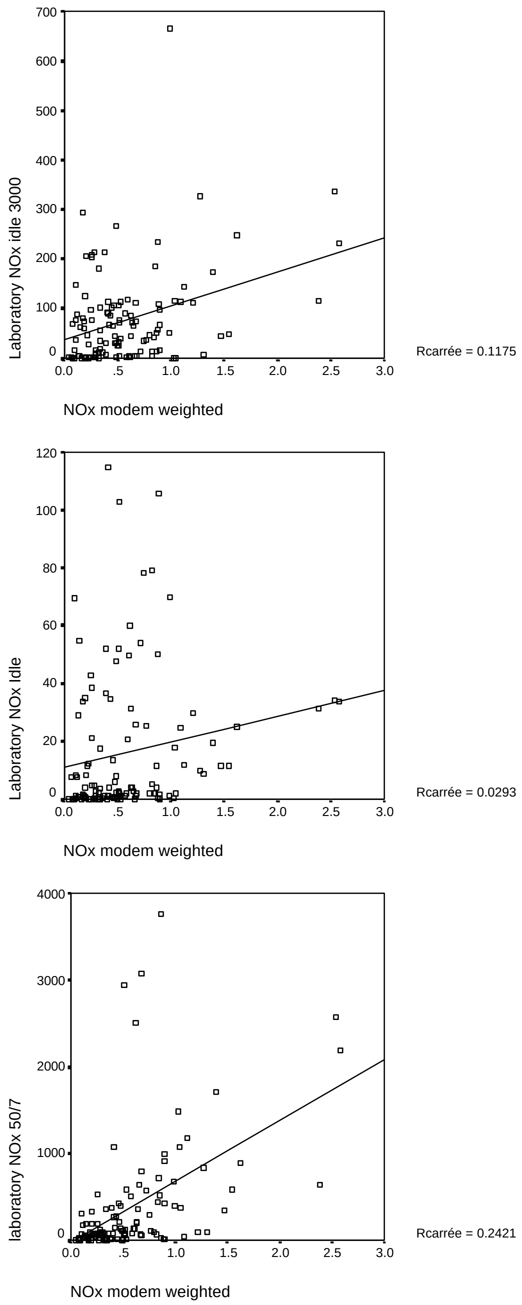


Figure 23 : correlation between NOx concentrations analysed in the laboratory for cycles 50/7, idle and idle 3000 versus NOx emissions for the modem weighted cycle.

For NOx emissions, the recorded correlations between the modem weighted and idle cycles, idle 3000 and 50/7 are very poor. No diagram has been available for garage analysers, since no test has been made.

3.2.2. Relationship for conventional gasoline

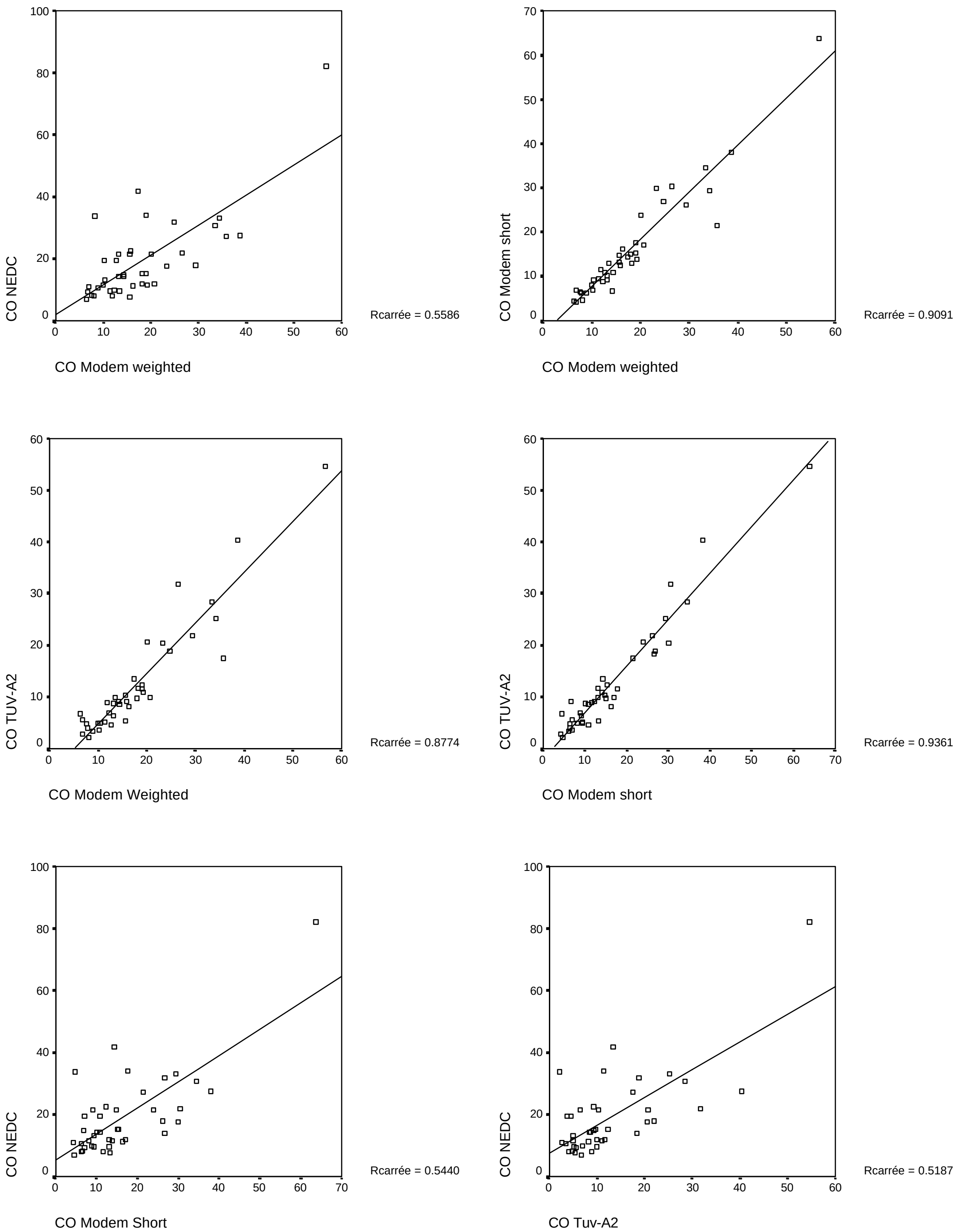


Figure 24 : CO emissions for each vehicle according to NEDC, modem weighted, TÜVA-2 and modem short cycles, compared to each other for non-catalyst vehicles.

A very good correlation can be noted between the modem short and modem weighted cycles, the modem weighted and TÜVA-2 cycles, and the modem short and TÜVA-2 cycles.

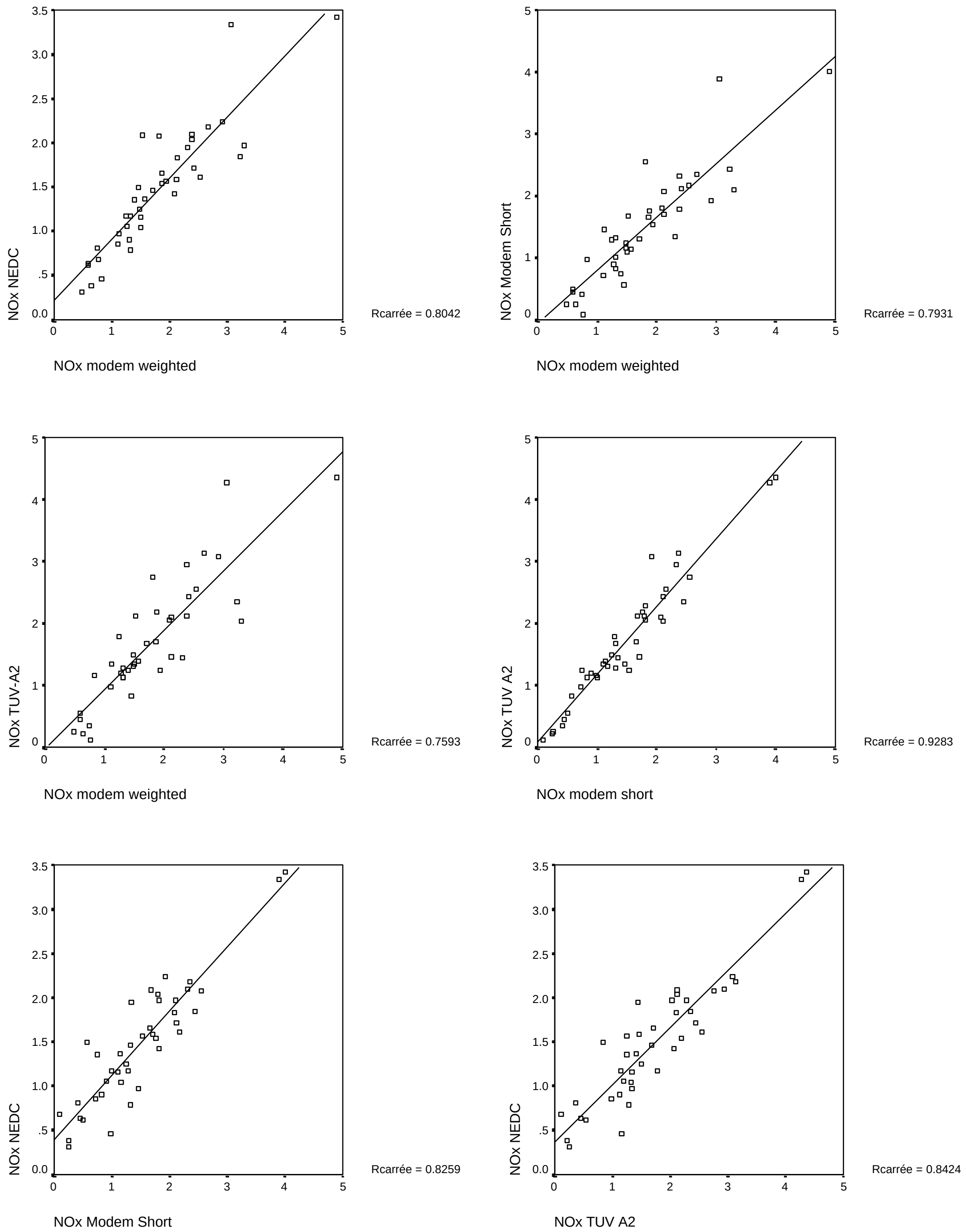


Figure 25 : NOx emissions for each vehicle according to NEDC, modem weighted, TÜVA-2 and modem short cycles, compared to each other for non-catalyst vehicles.

All NOx correlations are very good.

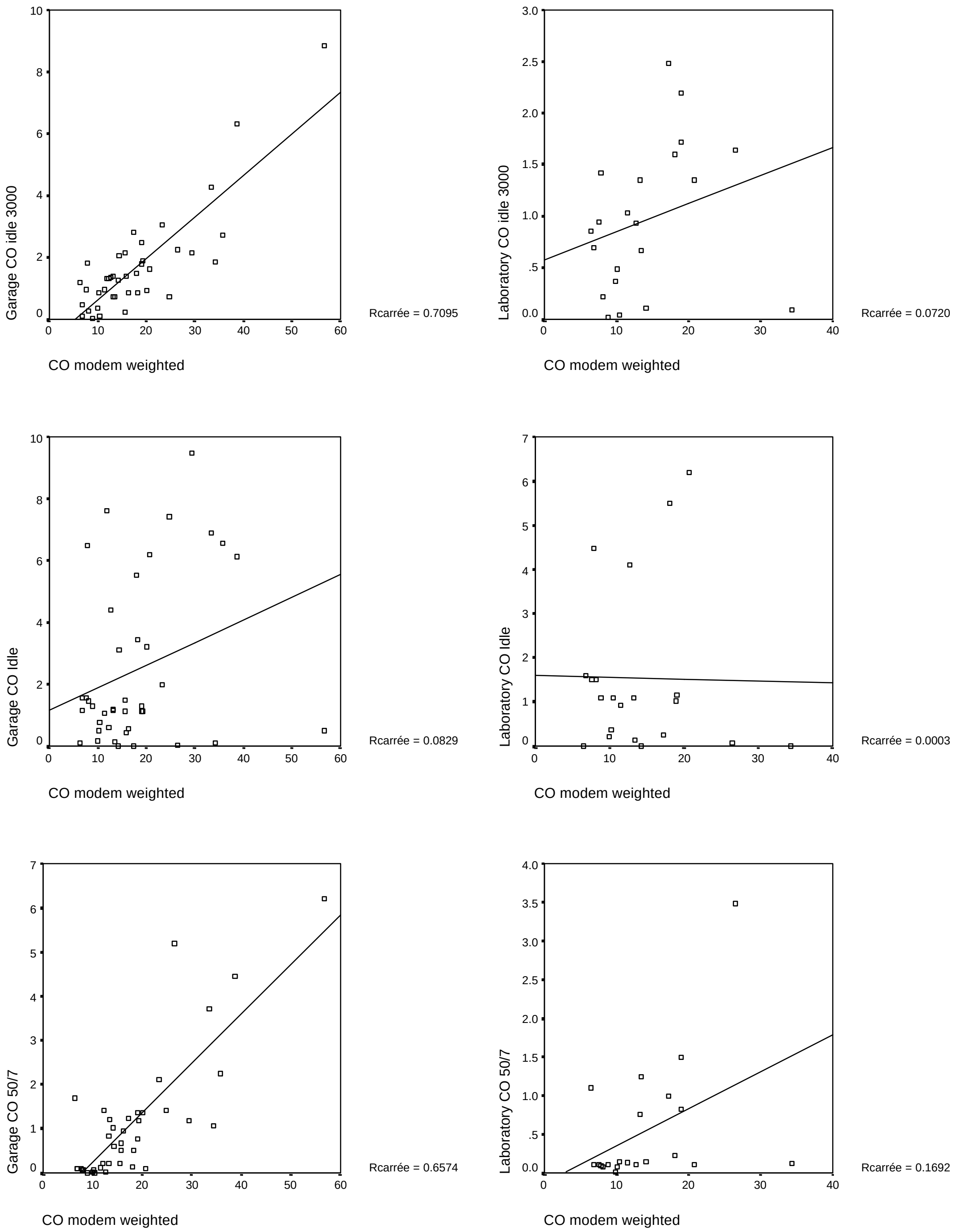


Figure 26 : correlations between CO concentrations for 50/7, idle and idle 3000 cycles versus CO emissions for the modem weighted, cycle, comparing garage and laboratory analysers.

None of these correlations is significant.

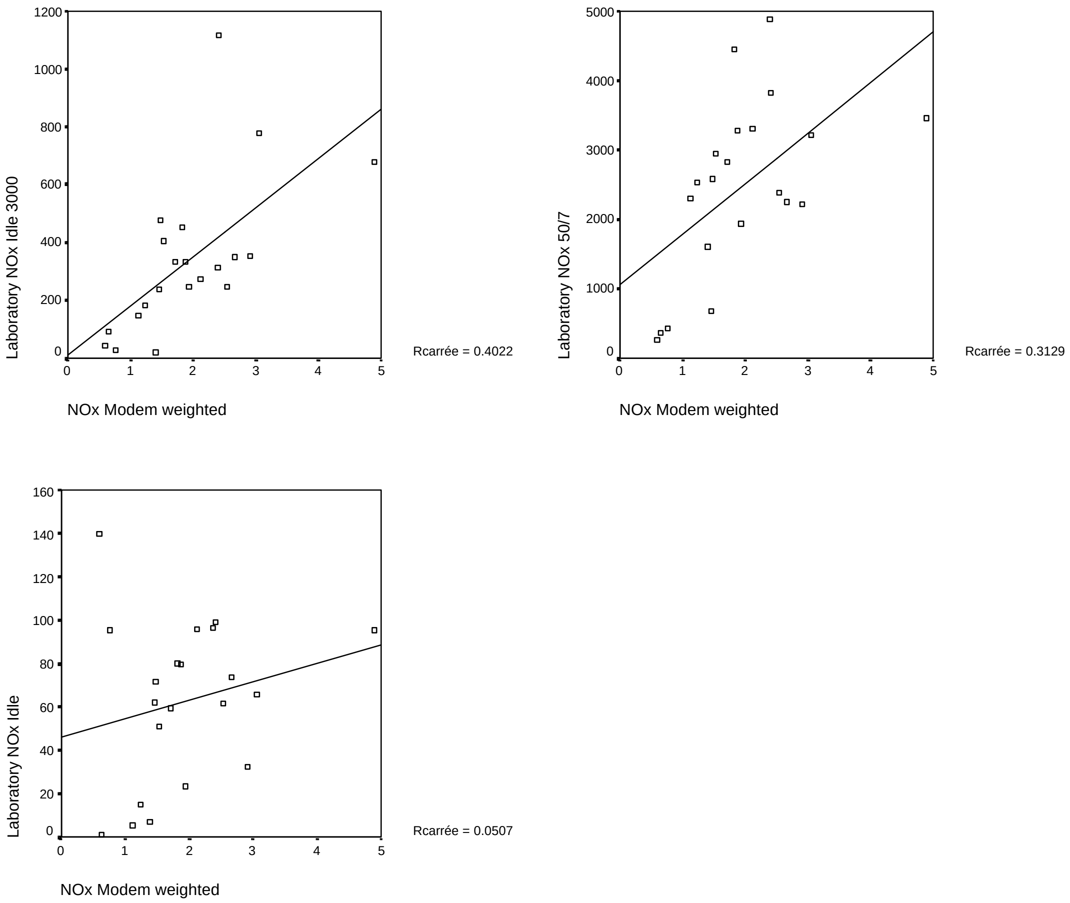


Figure 27 : correlations between NOx concentrations analysed in the laboratory for 50/7, idle and idle 3000 cycles versus NOx emissions for the modem weighted cycle.

No specific relationship is observed between the above graphs.

3.2.3. Relationship for diesel

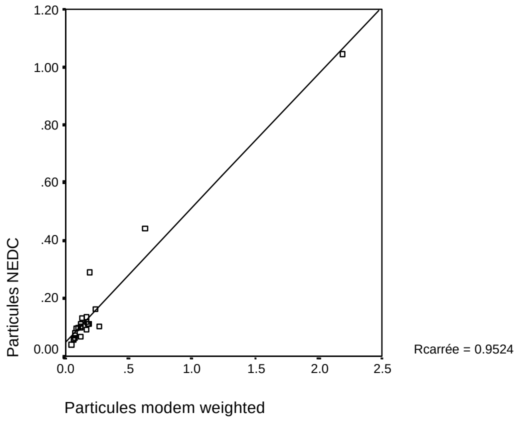
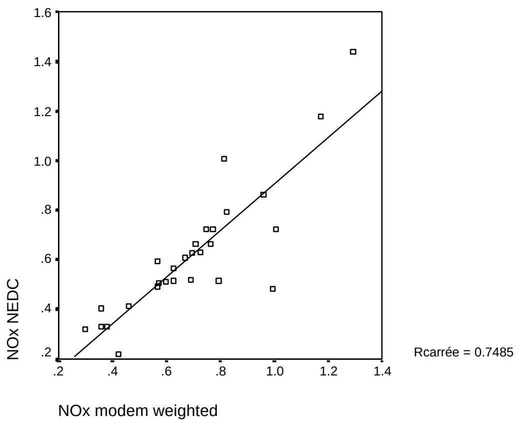
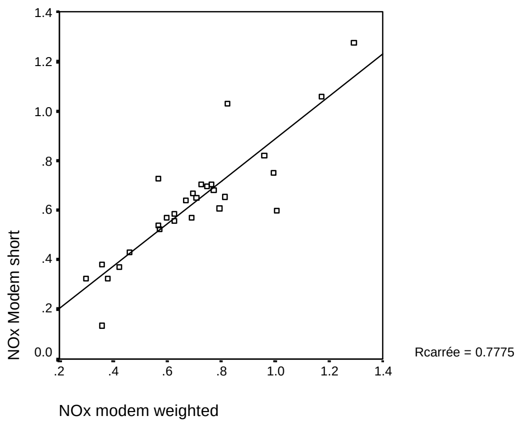
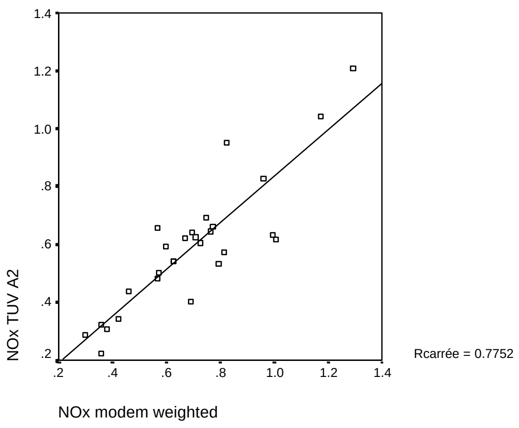


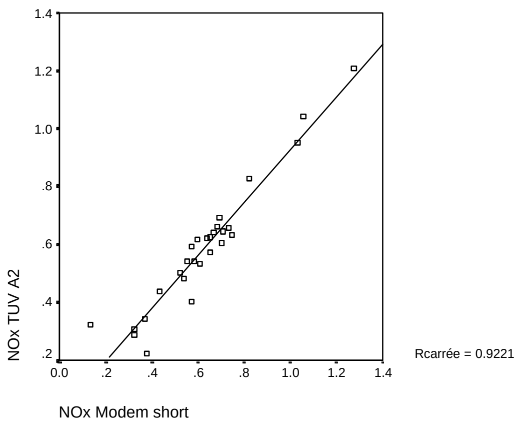
Figure 28 : Particle emissions for each vehicle according to NEDC and modem weighted cycles, compared to each other, for diesel vehicles.

As regards particles, only the relationship between the modem weighted and standard NEDC cycles is significant.









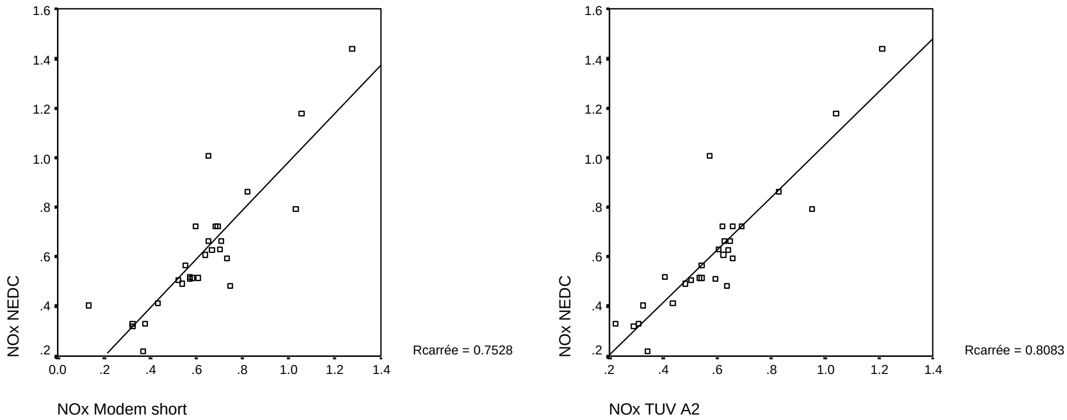


Figure 29 : NOx emissions for each vehicle according to NEDC, modem weighted, TÜVA-2 and modem short cycles, compared to each other for non-catalyst vehicles.

All these relationships are good for NOx.

Conclusion

In this study a wide panel of mostly randomly selected vehicles was analysed. A few number of vehicles were selected as high polluters.

- 192 3-way catalyst equipped cars complying with the emission standards of 91/441/EEC including a small number of LPG powered cars
- 41 conventional and oxidation catalyst equipped cars, complying with ECE 15/04 emission standard (34 cars) and with intermediate emission standards (7 oxidation catalyst equipped cars)
- 28 diesel cars complying with a large number of emission standards (from ECE 15/04 to 91/441/EEC)

For the vehicles which did not comply with the standard requirements a maintenance operation was performed. These were then tested again. We therefore get:

- 56 catalyst vehicles re-tested after maintenance,
- 22 gasoline vehicle re-tested after maintenance,
- 3 diesels re-tested after maintenance.

The test protocol which was used comprised apart of the certification cycle (NEDC) a real world cycle (IM Modem cycle), two short transient tests (TÜV-A2 and IM Modem short), one steady state loaded test (7 kW at 50 km/h) and no-load tests (idle and high idle for gasoline cars and free acceleration tests for diesel cars). The tests involved bag-based emissions and continuous measurement of raw exhaust concentrations, usage of garage and laboratory analysers and checks of the effects of simplified inertia weights.

When comparing the results obtained by five laboratories in charge of measurements, more or less significant variations can be observed as regards:

Average vehicle characteristic data (engine capacity, power, weight and mileage)
Test performance conditions (air pressure, temperature and humidity).

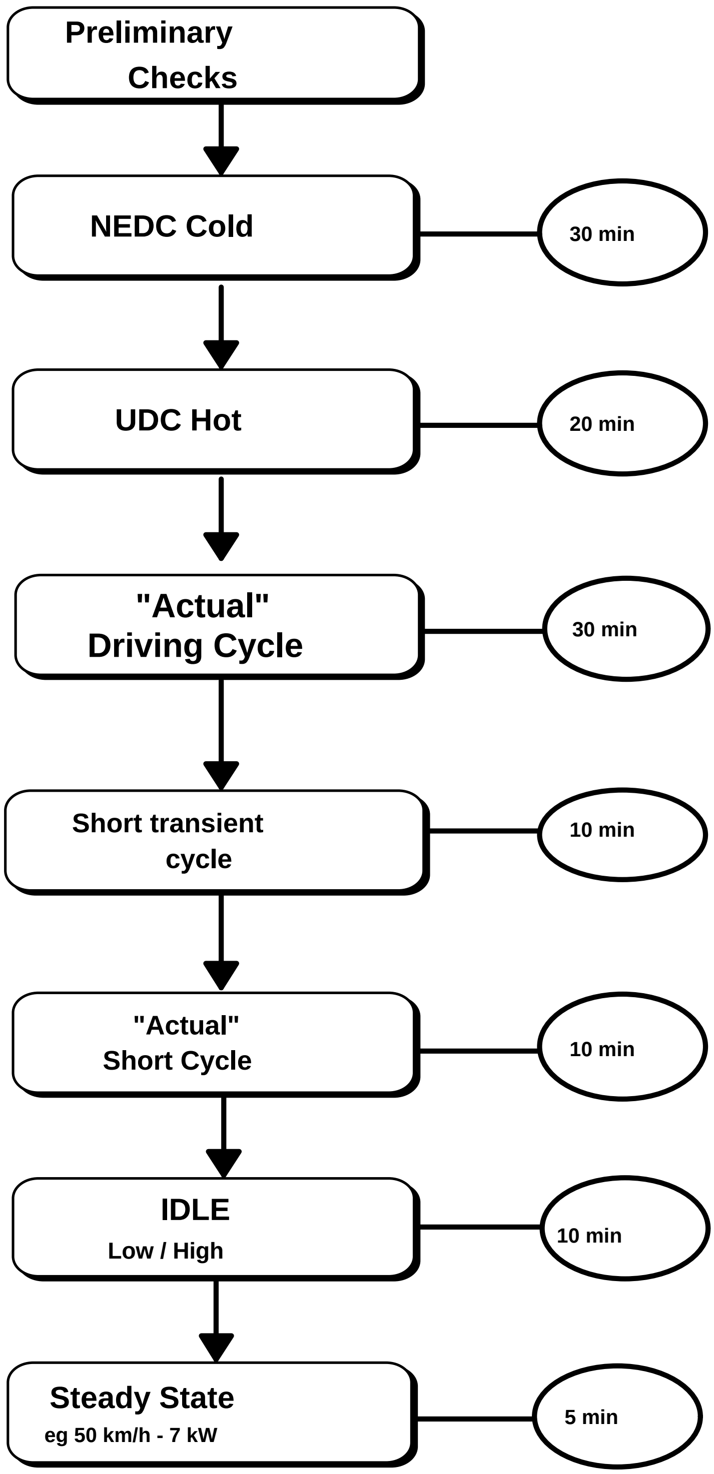
For the whole results obtained over all the test vehicles, it should be observed that vehicle emissions after a maintenance operation are always higher than those recorded for non-maintained vehicles since maintenance enables a significant decrease in emissions.

Significant correlations were recorded between CO2 emission and fuel consumption and the vehicle technical parameters.

When considering the relationships between the various test cycles, the best results obtained (whatever the vehicle type), between long and short cycles are recorded for the IM modem weighted and NEDC cycles. A good agreement can also be observed between the IM modem short and TÜV-A2 short cycles. Relationships between IM modem weighted and CO

concentrations for 50/7 and idle cycles are also very good. This last result is true only for catalyst vehicles.

Annex 1 : Test sequence for gasoline cars



Annex 2 : Gasoline vehicle testing protocol

1st day evening: Vehicle delivery

1. Fill in vehicle data (car type, odometer mileage etc.)
2. Check for existence of air filter, exhaust tightness, correct tyre pressure, existence of fuel inlet restrictor (where applicable), existence of catalyst (where applicable), air pump (where applicable), PCV, EGR (where applicable), idle speed.
3. Condition the vehicle by running two consecutive NEDCs and let it soak for 12-36 hours.

2nd day: Test sequence on vehicle as received

4. Calibrate the analysers.
5. Adjust dynamometer and flywheels to account for the vehicle's reference weight class according to 91/441/EEC; adjust CVS flow rate.
6. Connect the vehicle's exhaust with CVS (preferably an open one). Insert a probe in the tailpipe for continuous concentration measurements (to be conducted either with the laboratory analysers or with a portable four-gas analyser).
7. Select the (NEDC cold + UDC hot) driver's aid.
8. Record ambient temperature, pressure and relative humidity.
9. Perform a (NEDC cold + UDC hot). Start sampling after initial 40 seconds of idling. Use three bags for the collection of emissions: one for cold UDC, one for EUDC and one for the hot UDC portion. Record instantaneous concentrations continuously during the whole sequence; these will be undiluted CO_2, CO, HC, NO_X concentrations and diluted CO_2 concentrations (in order to determine the instantaneous dilution ratio).
10. Connect the three bags consecutively with the analysers; record CO, HC_{FID}, NO_X, CO_2 concentrations for each bag.
11. Let zero gas flow through the analysers, which are used for modal analysis.
12. Empty all bags.
13. Select driver's aid for *modem* "actual" cycle.
14. Record ambient temperature, pressure and relative humidity.
15. Perform a *modem* "actual" cycle. Use four bags. Record instantaneous concentrations continuously during the whole cycle.
16. Connect bag(s) with analysers and record CO, HC_{FID}, NO_X, CO_2 concentrations.

17. Let zero gas flow through the analysers, which are used for modal analysis.

18. Empty bag(s).

19. Select the combined TÜV A + INRETS driver's aid, which will consist of two repetitions of TÜV Rheinland's short cycle A and one repetition of the INRETS "actual" short cycle*. Use three bags (one for each cycle). Record instantaneous concentrations continuously during the whole sequence; these will be undiluted CO_2, CO, HC, NO_X concentrations and diluted CO_2 concentrations (in order to determine the instantaneous dilution ratio).

20. Make sure that CVS flow rate is between 5 and 7.5 m^3/min.

21. Record ambient temperature, pressure and relative humidity.

22. Perform the TÜV A + INRETS short cycle sequence.

23. Connect each one of the three bags consecutively with the analysers; record CO, HC_{FID}, NO_X, CO_2 concentrations.

24. Let zero gas flow through the analysers, which are used for modal analysis.

25. Empty bags.

26. If the vehicle's reference weight is different from the "simple" inertia weight setting**, then adjust dynamometer to account for its "simple" setting and repeat steps 21 through 25.

27. Disconnect the vehicle's exhaust from CVS. Do not remove the car from the rollers.

28. Insert one or two probes into the vehicle's exhaust: one of a portable exhaust gas analyser and/or one that is connected with the laboratory analysers.

29. Let the car idle at a speed of 3000 rpm with the transmission in neutral position until concentrations have been stabilised.

30. Record CO, HC_{NDIR} and CO_2 concentrations and λ value indicated by the portable analyser, and/or CO, HC_{FID}, NO_X and CO_2 concentrations indicated by the laboratory analysers.

31. Let the car idle with the transmission in neutral position until concentrations have been stabilised.

32. Repeat step 30.

33. Adjust the dynamometer for constant power absorption of 7 kW.

34. Drive the vehicle at 50 km/h at third gear until concentrations have been stabilised.

35. Repeat step 30.

36. Record ambient temperature, pressure and relative humidity.

3rd day: Send vehicle for Maintenance

37. Vehicles emitting more than 50% over their Conformity of Production Standard, but possibly some clean vehicles as well, will be brought to either an authorised dealer or an average garage and will undergo standard maintenance (i.e. the checks and adjustments of

the vehicle's next regular service). Maintenance cost per vehicle should not exceed 2000 DM.

38. Bring the vehicle back to the laboratory and let it soak for 12-36 hours.

4th day: Test sequence on vehicle after Maintenance

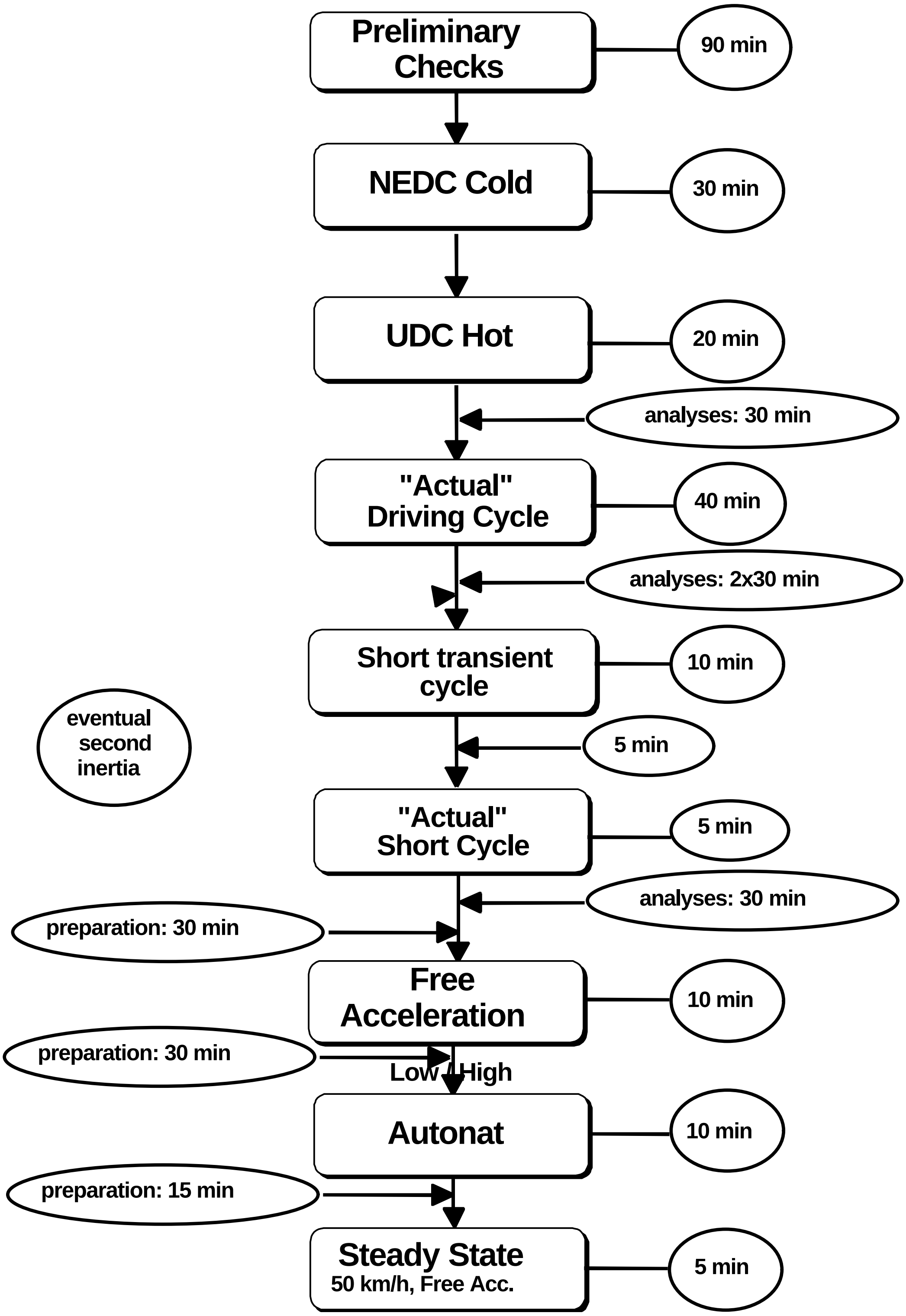
39. Repeat step 2 and steps 4 through 36.

* Note that the TÜV-A and the INRETS driving cycle are *two different* tests (not one combined cycle), which will be performed one after the other.

** "Simple" inertia weight settings are 800 kg (for reference weight < 1020 kg), 1130 kg (for 1020 < reference weight < 1470 kg) and 1590 kg (for reference weight > 1470 kg).

Note: Time intervals between consecutive test procedures (i.e. the period required to connect bags with analysers, record concentrations, empty bags etc.) should not exceed 15-20 minutes.

Annex 3 : Test sequence for diesel cars



Annex 4 : Diesel vehicle testing protocol

Time intervals between consecutive test procedures (i.e. the period required to connect bags with analysers, record concentrations, empty bags etc.) should not exceed 15-20 minutes.

1st day evening: vehicle delivery

1. Fill in vehicle data (car type, odometer mileage etc.)
2. Check for existence of air filter, exhaust tightness, correct tyre pressure, existence of catalyst (where applicable), EGR (where applicable), idle speed.
3. Adjust dynamometer and flywheels to account for the vehicle's reference weight class according to 91/441/EEC; adjust CVS flow rate.
4. Condition the vehicle by running three consecutive EUDCs and let it soak for more than 12 hours.
5. Put new particulate filters in the constant temperature and humidity chamber.

2nd day: test sequence on vehicle as received

6. Calibrate the analysers.
7. Weight clean particulate filters (2 per cycle).
8. Put particulate filters into the CVS.
9. Connect the vehicle's exhaust with CVS (a closed one). Insert a probe in the tailpipe for continuous concentration measurements (to be conducted either with the laboratory analysers or with a portable four-gas analyser).
10. Select the (NEDC cold + UDC hot) driver's aid.
11. Record ambient temperature, pressure and relative humidity.
12. Perform a (NEDC cold + UDC hot). Start sampling after initial 40 seconds of idling. Use three bags for the collection of emissions: one for cold UDC, one for EUDC and one for the hot UDC portion. Record instantaneous diluted concentrations continuously during the whole sequence (in order to determine the instantaneous emission).
13. Connect the three bags consecutively with the analysers; record CO, HC_{FID}, NOX, CO_2 concentrations for each bag.
14. Put the used particulate filters in the constant chamber.
15. Let zero gas flow through the analysers, which are used for modal analysis.

16. Empty all bags.
17. Put particulate filters into the CVS.
18. Select driver's aid for modem actual cycles.
19. Record ambient temperature, pressure and relative humidity.
20. Perform modem actual cycles. Use four bags. Record instantaneous concentrations continuously during the whole cycles.
21. Connect bag(s) with analysers and record CO, HC_{FID}, NOx, CO_2 concentrations.
22. Let zero gas flow through the analysers, which are used for modal analysis.
23. Put the used particulate filters in the constant chamber.
24. Empty bag(s).
25. Select the combined TÜV-A/short modem driver's aid, which will consist of two repetitions of TÜV Rheinland's short cycle A and one repetition of the modem short cycle. Use three bags (one for each cycle). Record instantaneous diluted concentrations continuously during the whole sequence (CO_2, CO, HC, and NOx), and the non-diluted concentrations (CO_2, CO, HC, NOx, and opacity).
26. Make sure that CVS flow rate is between 5 and 7.5 m^3/min.
27. Record ambient temperature, pressure and relative humidity.
28. Perform the TÜV-A/short modem cycle sequence.
29. Connect each one of the three bags consecutively with the analysers; record CO, HC_{FID}, NOx, CO_2 concentrations.
30. Let zero gas flow through the analysers, which are used for modal analysis.
31. Empty bags.
32. If the vehicle's reference weight is different from the "simple" inertia weight setting, then adjust dynamometer to account for its "simple" setting and repeat steps 27 through 31 ("simple" inertia weight settings are 800 kg for reference weight < 1020 kg, 1130 kg for 1020 < reference weight < 1470 kg and 1590 kg for reference weight > 1470 kg).
33. Disconnect the vehicle's exhaust from CVS. Do not remove the car from the rollers.
34. Connect the vehicle's exhaust to the opacimeter.
35. Let the car accelerate freely with the transmission in neutral position until engine speed has reached its maximum figure, following the national diesel free acceleration protocol.
36. Record opacity indicated by the opacimeter (average of the 3 or 4 maximum levels).
37. Install the Autonat system (Steps 37 and 38 only for INRETS).
38. Perform the Autonat test and record the output parameters (opacities, engine speeds...).

39. Adjust the dynamometer for constant power absorption of 7 kW.

40. Drive the vehicle at 50 km/h at third gear until concentrations have been stabilised.

41. Repeat step 36 *.

42. Record ambient temperature, pressure and relative humidity.

<u>3rd day: Send vehicle for Maintenance</u>

43. Weight the particulate filters used during the second day.

44. As already agreed, the vehicle will be brought to either an authorised dealer or an average garage and will undergo standard maintenance (i.e. the checks and adjustments of the vehicle's next regular service). Maintenance cost per vehicle should not exceed 2000 DM.

45. Bring the vehicle back to the laboratory, adjust the dynamometer and let it soak for more than 12 hours.

46. Put new particulate filters in the constant temperature and humidity chamber.

<u>4th day: Test sequence on vehicle after Maintenance</u>

47. Repeat step 2 and steps 6 through 42.

- Note that opacity measurement was in fact never recorded.

Annex 5: Drawing of the driving cycles

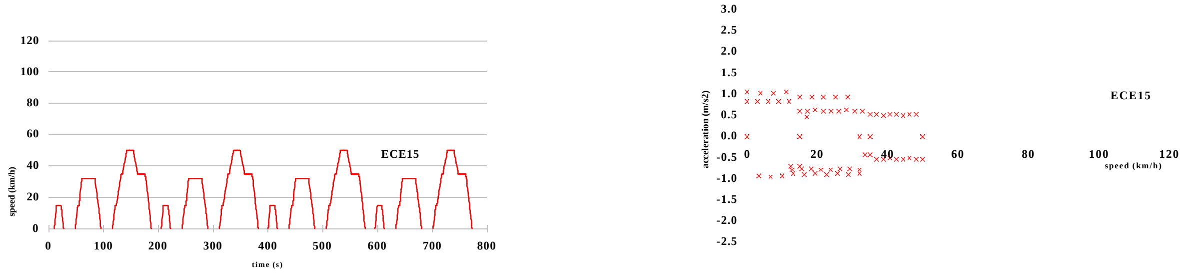


Figure 30: Speed versus time curve and acceleration versus speed distribution for the ECE15 cycle.

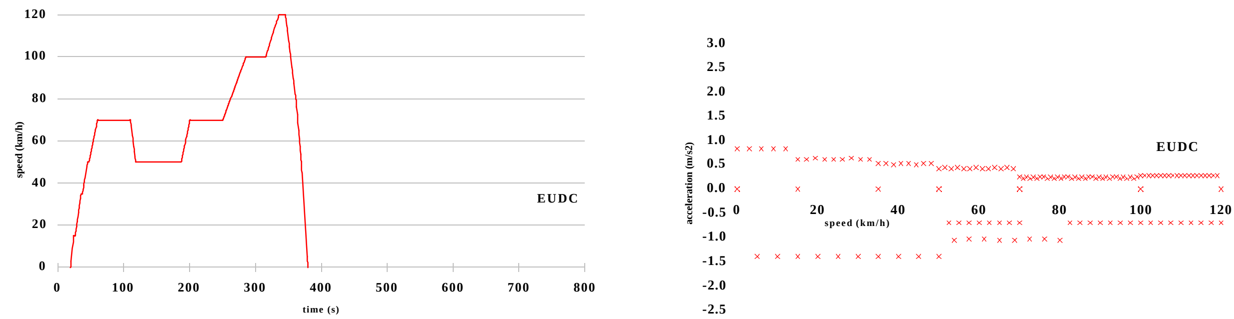


Figure 31 : Speed versus time curve and acceleration versus speed distribution for the EUDC cycle.

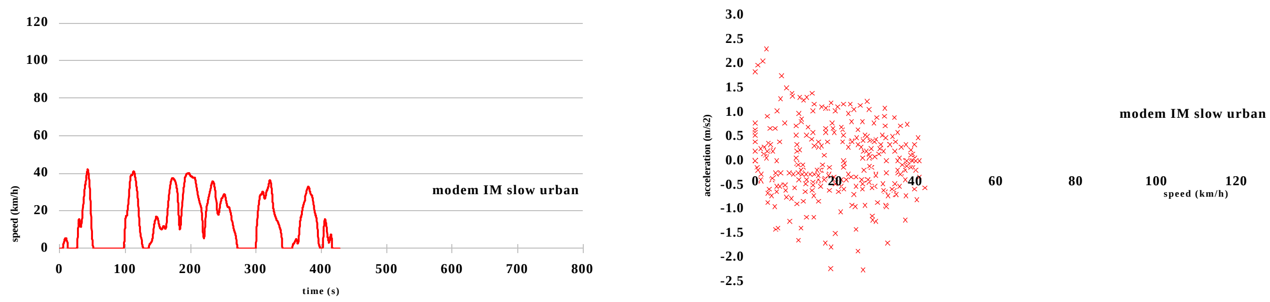


Figure 32 : Speed versus time curve and acceleration versus speed distribution for the modem IM slow urban cycle.

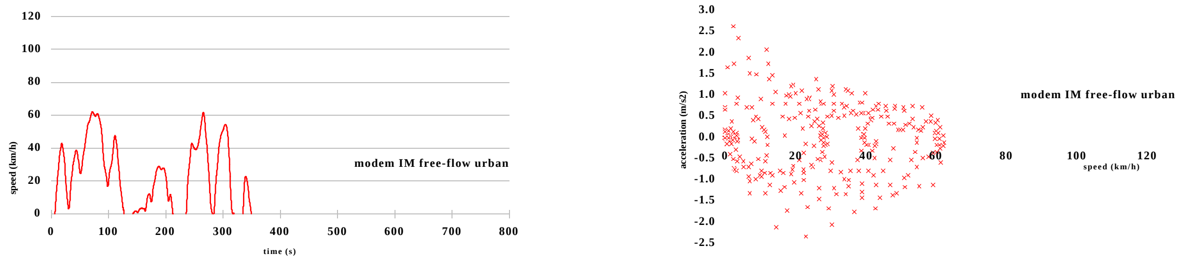


Figure 33 : Speed versus time curve and acceleration versus speed distribution for the modem IM free-flow urban cycle.

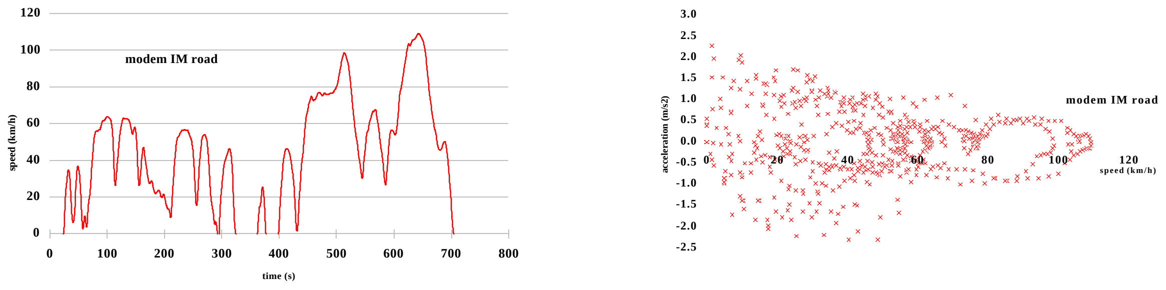


Figure 34 : Speed versus time curve and acceleration versus speed distribution for the modem IM road cycle.

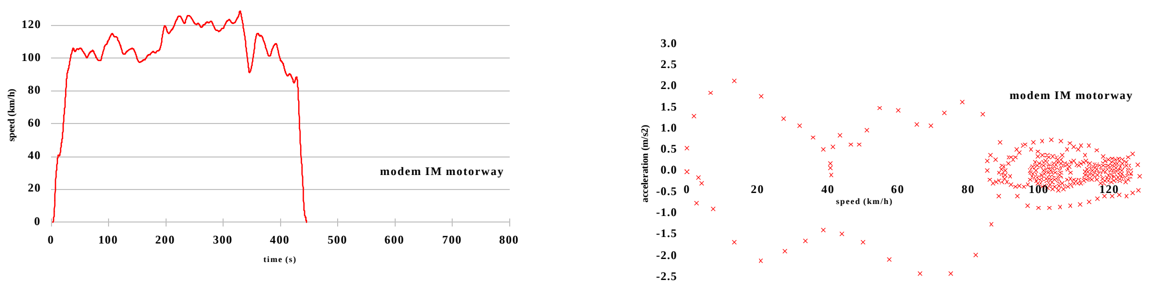


Figure 35 : Speed versus time curve and acceleration versus speed distribution for the modem IM motorway cycle.

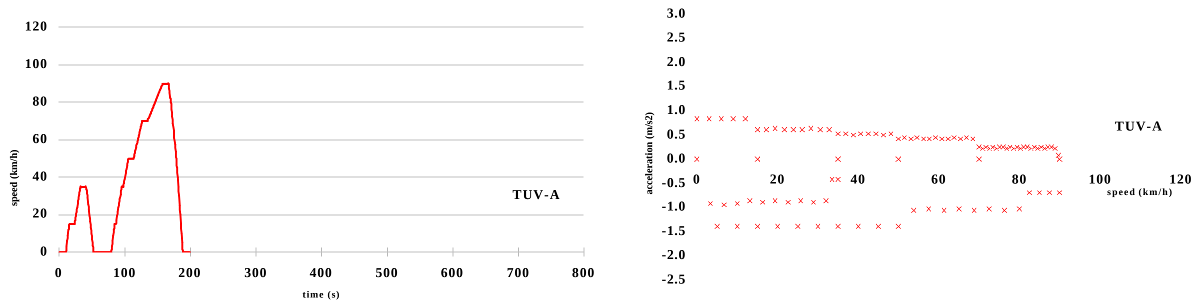


Figure 36 : Speed versus time curve and acceleration versus speed distribution for the TÜV-A short cycle.

Figure 37 : Speed versus time curve and acceleration versus speed distribution for the modem IM short cycle

Annex 6: List of measured parameters

Vehicle data

laboratory, lab-absolute vehicle number, make (for instance Peugeot), model (for instance 405-GTL), national vehicle type number,

veh. mass (empty veh., kg), max. power (kW), engine capacity (cm^3), number of speeds, gearbox type (manual : 1, automatic : 2),

first driving month, year, local name of the emission standard, normal fuel type (petrol : 1, diesel : 2, LPG : 3),

production emission standards (g/test, or g/km only for directive 91/441) for CO, HC+NOx, NOx, HC (expressed as in the standard, i.e. measured by NDIR for 1500 to 1503), particulates,

catalyst (without : 0, uncontrolled or oxidation cat : 2, 3W cat : 3), fuel system (carburettor : 1, elect. carburettor : 2, single point inj.: 3, multi point inj.: 4), EGR (without : 0, with : 1), air pump (without : 0, with : 1), charging system (no : 0, turbo : 1, comprex : 3, mechanical : 4),

mileage (km), type of vehicle provenance (private owner : 1, rental company : 2, company vehicle : 3, garage : 4, other : 5), choice type (1 : random choice, 2 : German AU, 3 : chosen as high emitter (TNO), 4 : from Remote Sensing tests)

size of tyres, tyre pressure at the test (bar),

number of long cycles performed, number of short cycles performed, number of idle/free acceleration/autonat tests performed, number of full load steady tests performed, number of line(s) of the additional comment,

For each long cycle (UDC cold, EUDC hot, UDC hot, 4 actual driving cycles : modem Urban Slow, modem Road, modem Urban Free Flow, modem Motorway)

laboratory, lab-absolute vehicle number, day, month, year of the test, maintenance (before maintenance but with possible later maintenance : 0, before maintenance but without possible later maintenance : 4, after maintenance in case of high emissions without any comment to the garage : 1, after maintenance in case of high emissions with comment (high emitter) to the garage : 2, after a random maintenance : 3), preconditioning (no : 0, yes : 1), inertia weight (kg),

pressure during the test (mbar or hPa), ambient temperature (°C), humidity (%), cycle name

(UDCcold, EUDC, UDChot, mUS, mR, mUFF, mM), actual driving distance (km),

for each pollutant (pollutant order : CO, CO_2, HC, NOx, part., F.C.) : emission (g/km),

For each short cycle (TÜV A, modem short cycle)

laboratory, lab-absolute vehicle number, day, month, year of the test, maintenance (before maintenance but with possible later maintenance : 0, before maintenance but without possible later maintenance : 4, after maintenance in case of high emissions without any comment to the garage : 1, after maintenance in case of high emissions with comment (high emitter) to the garage : 2, after a random maintenance : 3), preconditioning (no : 0, yes : 1), inertia weight (kg),

pressure during the test (mbar or hPa), ambient temperature (°C), humidity (%), cycle name (TÜV-A, mshort),

for each pollutant (pollutant order : CO, CO_2, HC, NOx, opacity, F.C.) :

emission (g/km), (raw conc. (ppmV for HC and NOx, % for CO and CO_2, m^{-1} for opacity) : average, percentiles 50, 60, 70, 80, 90, 100), diluted average conc. (ppmV for HC and NOx, % for CO and CO_2),

For each high idle, idle, free acceleration, or Autonat test

laboratory, lab-absolute vehicle number, day, month, year of the test, maintenance (before maintenance but with possible later maintenance : 0, before maintenance but without possible later maintenance : 4, after maintenance in case of high emissions without any comment to the garage : 1, after maintenance in case of high emissions with comment (high emitter) to the garage : 2, after a random maintenance : 3), preconditioning (no : 0, yes : 1), inertia weight (kg),

pressure during the test (mbar or hPa), ambient temperature (°C), humidity (%), cycle name (idle3000, idle, free-acc, autonat),

engine speed (rpm), air fuel ratio λ, type of assessment of λ (not given : -1, calculated at lab : 1, from garage analyser : 2), (for the free acceleration test these figures are : -1, -1., -1)

For each pollutant (pollutant order : CO, CO_2, HC, NOx, opacity) :

garage analyser concentration (ppmV for HC and NOx, % for CO and CO_2, and m^{-1} for opacity), laboratory analyser concentration (ppmV for HC and NOx, % for CO and CO_2),

average opacity (m^{-1}) in acceleration, in steady state, globally, maximal opacity, (at) engine speed (rpm), maximal opacity flow (m^2), (at) engine speed (rpm), (these 7 figures are -1. for tests other than Autonat for diesel)

For each full load steady state test

laboratory, lab-absolute vehicle number, day, month, year of the test, maintenance (before

maintenance but with possible later maintenance : 0, before maintenance but without possible later maintenance : 4, after maintenance in case of high emissions without any comment to the garage : 1, after maintenance in case of high emissions with comment (high emitter) to the garage : 2, after a random maintenance : 3), preconditioning (no : 0, yes : 1), inertia weight (kg),

pressure during the test (mbar or hPa), ambient temperature (°C), humidity (%), cycle name (50/7, 50/acc, or possibly another one),

engine speed (rpm), air fuel ratio λ, type of assessment of λ (not given : -1, calculated at lab : 1, from garage analyser : 2),

For each pollutant (pollutant order : CO, CO_2, HC, NOx, opacity) :

garage analyser concentration (ppmV for HC and NOx, % for CO and CO_2, and m^{-1} for opacity), laboratory analyser concentration (ppmV for HC and NOx, % for CO and CO_2),

Additional comments

Annex 7: Vehicle sample

lab.	nber	manufacturer	vehicle type	nat. veh. type nber	mass (kg)	power (kW)	engine capac. (cm^3)	mileage (km)	considered as :
Inrets	228	Renault	Super5 GTL	B40105	740	43.0	1108	80000	gas. conv.
Inrets	229	Peugeot	405 GR	15BB22	1020	68.0	1580	100000	gas. conv.
Inrets	230	Renault	19 TXE	B53305A	965	66.5	1721	48000	gas. conv.
Inrets	233	Mazda	323 GLX	BG1322	935	54.0	1324	70000	gas. conv.
Inrets	236	Volkswagen	Polo College	86CHZ1	765	33.0	1272	85000	gas. conv.
Inrets	238	Peugeot	309 Green	2AK2D2	890	68.0	1580	35000	gas. conv.
Inrets	239	Ford	Escort 1600manhatan	AAFGC	915	65.0	1597	-	gas. conv.
Inrets	241	Renault	25 TXI	B29205	1270	102.0	1995	150000	gas. conv.
Inrets	245	Citroen	AX Kway	ZAZA	640	32.5	954	35000	gas. conv.
Inrets	251	Rover	Austin Mini	xl2510	650	30.0	998	40000	gas. conv.
Inrets	276	Renault	Super5 GTL	C40205	740	43.0	1397	120510	gas. conv.
Inrets	278	Renault	21 Nevada	K482F5	1015	55.0	1721	300000	gas. conv.
Inrets	281	Citroen	BX Image	XBEG	950	68.0	1580	79000	gas. conv.
Inrets	284	Fiat	Uno Pop	146CD43A	700	33.0	903	97590	gas. conv.
Inrets	286	Peugeot	309 SR	10AB12	870	58.0	1580	133000	gas. conv.
Inrets	289	Opel	Kadett 1.6S	TU408	890	60.0	1598	60900	gas. conv.
Inrets	291	Peugeot	405 GR	15BD22A	1020	81.0	1905	81000	gas. conv.
Inrets	293	Peugeot	205 GL	741A11	740	31.5	954	96230	gas. conv.
Inrets	294	Peugeot	106 XT	1AKDY2	820	55.0	1360	47000	gas. conv.
Lat	4	Mazda	323 F	NBE 6374	1035	70.0	1600	89012	gas. conv.
Lat	9	Mazda	323 F	NBE 6374	1035	70.0	1600	107727	gas. conv.
Lat	10	Renault	19 GTS	AHA 1761	940	60.0	1390	79000	gas. conv.
Lat	23	Nissan	Sunny 1.4 SLX	NAX 4098	975	54.0	1400	58224	gas. conv.
Lat	59	Lada	Niva	NBE 4953	1095	53.7	1600	141000	gas. conv.
Lat	61	Subaru	M 80	HPZ 2539	675	30.9	750	109100	gas. conv.
Tno	556	Alfa Romeo	33 1.3V	DN-GV-79	930	63.0	1351	48354	gas. conv.
Trl	2	Ford	Sierra	K396 SJF	1115	85.0	1993	52680	gas. conv.
Trl	3	Rover	Metro	L337 CTX	830	44.0	1120	29410	gas. conv.
Trl	6	Peugeot	405	J29 NJF	1020	68.0	1580	161680	gas. conv.
Trl	7	Rover	214	K439 RJU	1030	70.0	1396	75410	gas. conv.
Trl	8	Rover	Metro	L435 YPM	845	44.0	1120	56160	gas. conv.
Trl	11	Ford	Granada	G273 CVC	1243	92.0	1998	279980	gas. conv.
Trl	12	Ford	Escort	H873 VBD	915	51.0	1296	110120	gas. conv.
Trl	13	Citroen	ZX	J833 MKC	945	55.0	1360	95630	gas. conv.
Trl	14	Volvo	340 GL	H984 VHH	983	62.0	1721	73860	gas. conv.
Trl	15	Vauxhall	Cavalier	K811 YTM	1005	61.0	1598	80770	gas. conv.
Trl	16	Ford	Fiesta	J107 KJF	810	40.0	1118	64410	gas. conv.
Trl	17	Ford	Escort	H433 NNO	1030	54.0	1392	96590	gas. conv.
Trl	18	Vauxhall	Astra	J894 ODU	910	53.0	1389	137790	gas. conv.
Trl	19	Volvo	340 DL	G172 GVV	997	53.0	1397	163310	gas. conv.
Trl	20	Rover	Metro 1.1S	J648 VUX	845	44.0	1120	102390	gas. conv.

lab.	nber	manufacturer	vehicle type	nat. veh. type nber	mass (kg)	power (kW)	engine capac. (cm^3)	mileage (km)	considered as :
Inrets	227	Renault	Laguna 1.8RN	B56BJC	1125	68.5	1794	27000	gas. 3Wcat
Inrets	247	Peugeot	106 kid	1ccdz2	780	32.5	954	2700	gas. 3Wcat
Inrets	248	Honda	Concerto 1.6	hwwnr	1100	90.0	1590	60000	gas. 3Wcat
Inrets	249	Opel	Astra 1.6i	tar4	1010	53.6	1598	22000	gas. 3Wcat
Inrets	262	Renault	Clio 1.2RT	c57a05	825	43.0	1171	21000	gas. 3Wcat
Inrets	264	Peugeot	106 XT	1akdyd	840	62.5	1360	29000	gas. 3Wcat
Inrets	265	Renault	Twingo	c06305	790	40.0	1239	28000	gas. 3Wcat
Inrets	266	Fiat	Punto 55	176ba53f	840	40.0	1108	20000	gas. 3Wcat
Inrets	267	Citroen	Xantia 2.0i	x17b	1290	89.0	1998	30000	gas. 3Wcat
Inrets	268	Renault	Safrane RN	b54005	1370	77.0	1995	15000	gas. 3Wcat
Inrets	271	Fiat	Panda Fire	41ao53a	715	33.0	998	28000	gas. 3Wcat
Inrets	272	Opel	Corsa 1.2i	s74e08	770	33.0	1196	35000	gas. 3Wcat
Inrets	273	Renault	Clio 1.4RN	b57b05	860	58.8	1390	38000	gas. 3Wcat
Inrets	274	Peugeot	806 sr	221rb2	1510	89.0	1998	2500	gas. 3Wcat
Inrets	275	Alfa Romeo	33 Trofeo	907a38	970	65.0	1351	35000	gas. 3Wcat
Inrets	280	Renault	Twingo	C06305	790	40.0	1239	7505	gas. 3Wcat
Lat	1	Alfa Romeo	33 1.4i	NBZ 5049	940	67.0	1351	56305	gas. 3Wcat
Lat	2	Renault	Clio 1.4 RN	KBE 1181	845	60.0	1390	79900	gas. 3Wcat
Lat	3	Nissan	Sunny 1.6 SGX	NBZ 7252	975	75.0	1597	46000	gas. 3Wcat
Lat	5	FIAT	Tempra 1.6 ie cat	NBE 1928	1025	57.0	1580	18247	gas. 3Wcat
Lat	6	HONDA	Civic ESi 16v	NBI 6601	985	95.0	1600	44942	gas. 3Wcat
Lat	7	Fiat	Uno	YXE 9157	720	34.0	1000	72400	gas. 3Wcat
Lat	8	BMW	318i	PAO 2320	1170	85.0	1800	46297	gas. 3Wcat
Lat	11	Opel	Corsa	YEO 2970	800	34.0	1200	29100	gas. 3Wcat
Lat	12	Fiat	Cinquecento	NBN 3309	710	30.0	990	14125	gas. 3Wcat
Lat	13	Opel	Astra	NBZ 8411	960	45.0	1400	44000	gas. 3Wcat
Lat	14	Citroen	ZX	HME 1113	945	56.2	1400	44300	gas. 3Wcat
Lat	15	Citroen	AX 14 TZX	NBZ 6900	755	56.2	1400	23750	gas. 3Wcat
Lat	16	Renault	Clio Bebop	NBO 2950	835	45.0	1200	15050	gas. 3Wcat
Lat	17	Lada	Samara 1300 S	NBI 8054	940	47.0	1300	34818	gas. 3Wcat
Lat	18	Fiat	Tipo AGT	NBA 8462	945	53.0	1400	54500	gas. 3Wcat
Lat	19	Toyota	Carina II	NBE 2213	1060	75.0	1600	79693	gas. 3Wcat
Lat	20	VW	Golf	NBI 6819	985	45.0	1400	58800	gas. 3Wcat
Lat	21	Nissan	Sunny	NBI 3148	1045	67.5	1600	110390	gas. 3Wcat
Lat	22	Alfa Romeo	146 1.4	NBT 8205	1175	67.5	1400	5779	gas. 3Wcat
Lat	24	VW	Passat GL	ZH 614777	1055	60.0	1800	164480	gas. 3Wcat
Lat	25	Suzuki	Swift 1.3 Sedan	NBA 9374	895	52.5	1300	139050	gas. 3Wcat
Lat	26	Ford	Fiesta	YEO 3962	845	37.0	1100	35134	gas. 3Wcat
Lat	27	Honda	Civic 1.5 LSi	NBH 1648	1035	68.0	1500	42617	gas. 3Wcat
Lat	28	Opel	Vectra GLS 1.6i	NBA 9094	1045	56.2	1600	105410	gas. 3Wcat
Lat	29	Hyundai	S Coupe LS	NBA 5607	950	60.0	1500	52710	gas. 3Wcat
Lat	30	Mercedes	190 E	NBA 7697	1185	71.2	1800	79500	gas. 3Wcat
Lat	31	Peugeot	106 XR	PIH 2320	845	56.2	1400	10153	gas. 3Wcat
Lat	32	Peugeot	309 XR	NBA 4792	935	56.2	1400	74389	gas. 3Wcat
Lat	33	Peugeot	306 XR	NBM 8144	1045	56.2	1400	45780	gas. 3Wcat
Lat	34	Peugeot	205	NBM 2547	875	56.2	1400	56515	gas. 3Wcat
Lat	35	Ford	Fiesta	YEO 8079	845	37.0	1100	33100	gas. 3Wcat
Lat	36	Seat	Ibiza	NBP 1843	945	41.2	1300	30900	gas. 3Wcat
Lat	37	Nissan	Micra	NBY 4338	815	41.2	1000	6470	gas. 3Wcat
Lat	38	VW	Golf	NBI 6020	1015	45.0	1400	67871	gas. 3Wcat
Lat	39	Citroen	ZX	NBP 1683	945	56.2	1400	27260	gas. 3Wcat
Lat	40	Toyota	Starlet 1.3 XLi	NBZ 7056	805	56.2	1300	41271	gas. 3Wcat
Lat	41	Toyota	Corolla 1.6 GLi	YOP 4006	1050	86.2	1600	67909	gas. 3Wcat
Lat	42	Lancia	Y10	YKZ 7663	815	41.2	1100	25600	gas. 3Wcat
Lat	43	Citroen	BX	NAX 6473	935	56.2	1400	108970	gas. 3Wcat
Lat	44	Mitsubishi	Lancer	NBB 2567	965	56.2	1300	77827	gas. 3Wcat

Lat	45	Toyota	Corolla 1.3	YOP 4560	1025	61.5	1300	50460	gas. 3Wcat
lab.	nber	manufacturer	vehicle type	nat. veh. type nber	mass	power	engine capac.	mileage	considered as :
					(kg)	(kW)	(cm^3)	(km)	
Lat	46	Toyota	Starlet	YON 4963	805	56.2	1300	99764	gas. 3Wcat
Lat	47	Toyota	Corolla 1.3	YOO 9987	1025	61.5	1300	24616	gas. 3Wcat
Lat	48	Ford	Fiesta 1.2s	YXP 4113	995	56.2	1300	4824	gas. 3Wcat
Lat	49	Fiat	Punto 75	NBP 5517	905	56.2	1300	11705	gas. 3Wcat
Lat	50	Ford	Escort 1.3	NBP 8035	1065	45.0	1300	11641	gas. 3Wcat
Lat	51	BMW	518i	NBZ 9595	1355	84.8	1800	99750	gas. 3Wcat
Lat	52	Lancia	Delta	NBY 7784	1125	55.5	1400	5100	gas. 3Wcat
Lat	53	Renault	19 RN	NBI 7121	970	60.0	1400	59450	gas. 3Wcat
Lat	54	Fiat	Uno	YXE 9157	720	34.0	1000	72400	gas. 3Wcat
Lat	55	Lancia	Dedra	NBH 2965	1165	59.5	1600	65600	gas. 3Wcat
Lat	56	Seat	Toledo	NBE 1256	1045	94.8	1800	148000	gas. 3Wcat
Lat	57	Skoda	Favorit	NBK 4304	865	47.8	1300	33032	gas. 3Wcat
Lat	58	Rover	214i	NBB 8512	1075	74.2	1400	85000	gas. 3Wcat
Lat	60	Alfa	Romeo 33	NBM 5806	975	67.0	1400	49554	gas. 3Wcat
Lat	62	Nissan	Sunny	NBE 7415	1045	67.5	1600	58560	gas. 3Wcat
Lat	63	Volvo	460 Turbo	NBZ 7203	1095	88.0	1700	61791	gas. 3Wcat
Lat	64	Ford	Sierra 1.6 CL	NBE 8292	1055	58.8	1600	97800	gas. 3Wcat
Lat	65	Honda	Civic ESi	NBP 3317	1035	91.9	1600	79300	gas. 3Wcat
Lat	66	Citroen	BX	NBH 2326	935	55.1	1400	60900	gas. 3Wcat
Lat	67	Renault	Clio Bebop	NBP 7962	835	45.0	1200	66000	gas. 3Wcat
Lat	68	Fiat	Tempra	NBA 5327	1025	57.0	1600	82000	gas. 3Wcat
Lat	69	Nissan	Sunny 1.6 SGX	NBH 1878	1045	66.2	1600	44976	gas. 3Wcat
Tno	501	FORD	MONDEO 1.8 GLX	JP-FF-32	1250	82.0	1796	14589	gas. 3Wcat
Tno	502	BMW	730 i V8	JX-FJ-08	1749	160.0	2997	7660	gas. 3Wcat
Tno	503	VOLVO	850 GLT	FB-ZX-67	1341	125.0	2435	64422	gas. 3Wcat
Tno	504	NISSAN	MAXIMA QX 2.0 V6	JZ-DZ-42	1320	103.0	1995	8004	gas. 3Wcat
Tno	505	MAZDA	626 Hatchback 2.2i A	YL-50-DR	1170	83.0	2184	54988	gas. 3Wcat
Tno	506	RENAULT	5 TL	YB-46-NY	766	43.0	1390	61745	gas. 3Wcat
Tno	507	RENAULT	LAGUNA 1.8	HZ-JN-20	1285	68.5	1794	41370	gas. 3Wcat
Tno	508	OPEL	VECTRA C1.8NZ auto	JB-BX-84	1158	66.0	1796	58817	gas. 3Wcat
Tno	509	LANCIA	DEDRA 1.8ie	ZT-76-GK	1183	77.0	1756	160627	gas. 3Wcat
Tno	510	NISSAN	MICRA 1.2	YK-06-HP	720	40.0	1235	81585	gas. 3Wcat
Tno	511	VOLVO	940 POLAR 2.3 i	JS-FX-28	1384	85.0	2316	18524	gas. 3Wcat
Tno	512	HYUNDA	SONATA 2.0i	HF-LX-84	1194	102.0	1997	44188	gas. 3Wcat
Tno	513	VOLVO	460 DL	JH-NF-80	989	66.0	1794	63503	gas. 3Wcat
Tno	514	LANCIA	DELTA 1.6	JD-NN-43	1147	55.0	1581	38372	gas. 3Wcat
Tno	515	FORD	THUNDERBIRD	HP-GF-26	1680	153.0	4600	31569	gas. 3Wcat
Tno	516	MERCEDES	C180	JJ-BN-06	1306	90.0	1799	46398	gas. 3Wcat
Tno	517	VOLKSWAGEN	POLO 33 kW	YV-72-PH	767	33.0	1043	58822	gas. 3Wcat
Tno	518	OPEL	VECTRA C1.8NZ	JS-BH-65	1080	66.0	1796	18477	gas. 3Wcat
Tno	519	RENAULT	LAGUNA 1.8	HZ-JN-20	1285	68.5	1794	41370	gas. 3Wcat
Tno	520	OPEL	VECTRA C1.8NZ auto	JB-BX-84	1158	66.0	1796	58817	gas. 3Wcat
Tno	521	FORD	MONDEO 1.8 GLX	JG-GT-84	1286	82.0	1796	62324	gas. 3Wcat
Tno	522	VOLVO	460 DL	JH-NF-80	989	66.0	1794	63503	gas. 3Wcat
Tno	523	MERCEDES	C180	JJ-BN-06	1306	90.0	1799	46398	gas. 3Wcat
Tno	526	VOLVO	440 GL (B18F)	YF-95-YR	1013	78.0	1721	54799	gas. 3Wcat
Tno	527	CITROEN	ZX 1.6i	DL-GV-85	1000	65.0	1580	72639	gas. 3Wcat
Tno	528	OPEL	ASTRA C1.4SE	DR-ZD-23	945	60.0	1389	68595	gas. 3Wcat
Tno	529	VW	VENTO 1.8 (ABS)	JR-VL-49	1071	66.0	1781	25624	gas. 3Wcat
Tno	525	VW	VENTO 1.8 (ABS)	JR-VL-49	1071	66.0	1781	25624	gas. 3Wcat
Tno	530	MERCEDES	E230	RS-82-YS	1270	100.0	2299	170153	gas. 3Wcat
Tno	531	VOLKSWAGEN	JETTA GT 79 kW	ZH-71-PP	950	79.0	1781	120635	gas. 3Wcat
Tno	532	VOLKSWAGEN	PASSAT	LB-51-FJ	947	66.0	1781	130064	gas. 3Wcat
Tno	533	PEUGEOT	205 1.4i	YS-18-LR	810	59.0	1360	56589	gas. 3Wcat
Tno	534	LANCIA	DELTA 1.8 GT ie	YN-11-JD	995	66.0	1585	57276	gas. 3Wcat

Tno	535	ALFA	164 3.0 V6	ZX-62-GS	1390	135.0	2959	123338	gas. 3Wcat
Tno	536	FORD	SIERRA 2.0i	YD-49-DN	1160	87.0	1998	65556	gas. 3Wcat

lab.	nber	manufacturer	vehicle type	nat. veh. type nber	mass (kg)	power (kW)	engine capac. (cm^3)	mileage (km)	considered as :
Tno	537	HYUNDAI	LANTRA 1.8 GT	GJ-DH-84	1098	93.0	1836	60410	gas. 3Wcat
Tno	538	VOLKSWAGEN	PASSAT	FG-TH-61	1173	66.0	1781	99234	gas. 3Wcat
Tno	539	BMW	525i	TS-13-LB	1450	125.0	2494	159327	gas. 3Wcat
Tno	540	FORD	ESCORT 1.6i	XH-05-LX	896	66.0	1597	61800	gas. 3Wcat
Tno	541	FORD	SCORPIO 2.9I AUT	ZS-29-SJ	1325	106.0	2935	100119	gas. 3Wcat
Tno	542	SEAT	IBIZA 1.2	ZB-78-KB	890	52.0	1193	108426	gas. 3Wcat
Tno	551	Volkswagen	Passat CL 66kW	FD-HN-55	1196	66.0	1781	99044	gas. 3Wcat
Tno	552	Citroen	BX 19 TGi Routiere	FN-FX-41	1003	80.0	1905	103702	gas. 3Wcat
Tno	553	Ford	Escort 1.6 16V	LL-TD-59	1065	66.0	1598	25469	gas. 3Wcat
Tno	554	Citroen	Xantia 1.8i	JT-FS-43	1220	76.0	1761	57183	gas. 3Wcat
Tno	555	Opel	Astra C18NZ	FZ-FS-22	1141	66.0	1796	128225	gas. 3Wcat
Tno	557	Volkswagen	Golf 51 kW	DN-RT-93	894	51.0	1595	136646	gas. 3Wcat
Tno	558	Mazda	626 Hatchback 1.8i 1	GP-HV-23	1130	78.0	1840	100346	gas. 3Wcat
Tno	559	Renault	Twingo	HG-DT-27	831	40.0	1239	20324	gas. 3Wcat
Tno	560	Nissan	Primera 1.6 LX	YV-69-NS	1075	66.0	1597	97466	gas. 3Wcat
Tno	561	Fiat	Tipo 1.4 i.e.	FX-BV-12	980	51.0	1372	43886	gas. 3Wcat
Tno	562	Opel	Astra Tailgate C14NZ	HR-LB-04	940	44.0	1388	57446	gas. 3Wcat
Tno	563	Peugeot	106 Accent 1.1	LV-NP-01	776	44.0	1124	50637	gas. 3Wcat
Tno	564	Volvo	440 DL 1.8i	FT-HB-81	993	66.0	1794	45826	gas. 3Wcat
Tno	565	Volkswagen	Vento CL 66kW	JH-FL-72	1120	66.0	1781	112288	gas. 3Wcat
Tno	566	Skoda	Favorit 1.3 L	DB-GH-04	844	46.0	1289	26678	gas. 3Wcat
Trl	1	Nissan	Sunny	K474 ECF	1005	61.0	1392	65250	gas. 3Wcat
Trl	4	Ford	Sierra	K508 RJF	1115	74.0	1993	207240	gas. 3Wcat
Trl	5	Alfa Romeo	133	L583 KVV	910	90.0	1712	52830	gas. 3Wcat
Trl	9	BMW	320i	L363 NVV	1315	92.0	1990	190080	gas. 3Wcat
Trl	10	Proton	1.5 SE	K893 DVV	948	55.0	1468	70580	gas. 3Wcat
Tüv	7	MB	E220	439030	1380	110.0	2199	27219	gas. 3Wcat
Tüv	8	MB	C180	464008	1350	90.0	1799	23178	gas. 3Wcat
Tüv	11	Opel	Omega	678076	1275	85.0	1998	44274	gas. 3Wcat
Tüv	12	Ford	Scorpio	757042	1350	107.0	2935	35528	gas. 3Wcat
Tüv	13	BMW	325i	506027	1295	141.0	2494	28018	gas. 3Wcat
Tüv	15	Mazda	121	124001	815	53.0	1324	28799	gas. 3Wcat
Tüv	16	Renault	Twingo	712006	810	40.0	1239	22566	gas. 3Wcat
Tüv	17	VW	Polo	960002	880	33.0	1043	4767	gas. 3Wcat
Tüv	18	Mitsubishi	Colt	485005	945	83.0	1597	9382	gas. 3Wcat
Tüv	20	Opel	Corsa	321042	835	33.0	1195	16841	gas. 3Wcat
Tüv	21	VW	Polo	661042	765	33.0	1043	22363	gas. 3Wcat
Tüv	23	Ford	Mondeo	843003	1325	100.0	1988	29192	gas. 3Wcat
Tüv	24	Opel	Corsa	321042	835	33.0	1195	10486	gas. 3Wcat
Tüv	25	Opel	Calibra	904004	1355	125.0	2498	31290	gas. 3Wcat
Tüv	28	Opel	Corsa	309309	775	33.0	1195	38868	gas. 3Wcat
Tüv	29	Honda	Accord	307000	1410	110.0	2156	22600	gas. 3Wcat
Tüv	30	Peugeot	306	738001	1260	89.0	1998	27188	gas. 3Wcat
Tüv	32	Renault	25	606012	1308	110.0	2849	77090	gas. 3Wcat
Tüv	33	Fiat	Cinquecento	607003	710	29.0	899	19139	gas. 3Wcat
Tüv	34	Fiat	Tempra	891007	1054	57.0	1581	16859	gas. 3Wcat
Tüv	40	BMW	530	526036	1595	160.0	2997	33395	gas. 3Wcat
Tüv	45	Nissan	Micra	318002	810	55.0	1275	40983	gas. 3Wcat
Tüv	50	BMW	316	508036	1230	73.0	1596	18202	gas. 3Wcat
Tüv	52	VW	Passat	659001	1100	85.0	2200	219132	gas. 3Wcat
Tüv	57	Audi	80	426005	1080	83.0	1964	66043	gas. 3Wcat
Tüv	58	VW	Passat	743105	1173	66.0	1781	76300	gas. 3Wcat
Tüv	59	VW	Polo	601058	785	40.0	1272	47858	gas. 3Wcat
Tüv	60	Opel	Astra	858005	1105	85.0	1998	49351	gas. 3Wcat

lab.	nber	manufacturer	vehicle type	nat. veh. type nber	mass (kg)	power (kW)	engine capac. (cm^3)	mileage (km)	considered as :
Tüv	61	VW	Golf	612230	928	66.0	1760	64058	gas. 3Wcat
Tüv	62	MB	230	340046	1385	97.0	2298	69009	gas. 3Wcat
Tüv	65	Opel	Astra	863012	950	55.0	1598	35106	gas. 3Wcat
Tüv	66	Ford	Escort	865001	1085	65.0	1597	31099	gas. 3Wcat
Tüv	68	MB	190	406124	1170	80.0	1797	36708	gas. 3Wcat
Tüv	69	BMW	320i	505175	1315	110.0	1991	29146	gas. 3Wcat
Tüv	81	Ford	Escort	781005	1015	52.0	1391	72084	gas. 3Wcat
Tüv	86	Ford	Fiesta	785006	800	37.0	1119	73708	gas. 3Wcat
Tüv	87	Ford	Escort	768011	920	44.0	1299	37057	gas. 3Wcat
Tüv	88	Nissan	Primera	308003	1180	85.0	1998	52659	gas. 3Wcat
Tüv	93	VW	Vento	899061	1075	66.0	1781	33675	gas. 3Wcat
Tüv	94	Audi	100	507010	1400	128.0	2771	70268	gas. 3Wcat
Tüv	103	Honda	Civic	459001	865	66.0	1493	127806	gas. 3Wcat
Tüv	110	Audi	100	393001	1250	100.0	2282	98087	gas. 3Wcat
Tüv	111	Mazda	626	364005	1135	66.0	1998	47505	gas. 3Wcat
Tüv	112	Mitsubishi	Lancer	464000	985	66.0	1468	132622	gas. 3Wcat
Tüv	118	BMW	525i	493036	1480	141.0	2494	80338	gas. 3Wcat
Tüv	132	Ford	Sierra	721054	1115	88.0	1998	143298	gas. 3Wcat
Tüv	165	Ford	Escort	770040	940	52.0	1391	38080	gas. 3Wcat
Tüv	167	Nissan	Sunny	429004	1000	54.0	1585	135394	gas. 3Wcat
Tüv	168	Fiat	Panda	827010	710	33.0	999	75247	gas. 3Wcat
Tüv	169	MB	260 E	342050	1420	118.0	2597	145634	gas. 3Wcat
Tüv	170	Renault	Clio	667005	825	40.0	1171	58552	gas. 3Wcat
Tüv	171	Ford	Scorpio	754005	1278	88.0	1998	53361	gas. 3Wcat
Tüv	172	Renault	Espace	323008	1198	79.0	2150	75105	gas. 3Wcat
Tüv	179	MB	230 E	381047	1335	97.0	2276	73571	gas. 3Wcat
Tüv	194	Opel	Kadett	640460	885	55.0	1598	33499	gas. 3Wcat
Tüv	197	VW	Passat	743026	1145	66.0	1760	155366	gas. 3Wcat
Inrets	234	Peugeot	205 XLD	20CA92	880	43.5	1769	140000	diesel
Inrets	235	Renault	19 RND	B53405	1113	47.0	1870	50000	diesel
Inrets	237	Mitsubishi	Space Wagon	N38WLNT	1330	60.0	1998	32000	diesel
Inrets	242	Peugeot	306 Style	VF37AD9	1080	51.0	1905	5000	diesel
Inrets	243	Peugeot	405 break style	4ed9b2	1120	51.5	1905	15000	diesel
Inrets	244	Fiat	Punto Turbo diesel	176af55a	1035	52.0	1698	14000	diesel
Inrets	246	Renault	21 Nevada	k48v05e	1165	54.5	2068	16000	diesel
Inrets	250	Citroen	ZX Flash	n2d5	1090	51.0	1905	30000	diesel
Inrets	252	Opel	Corsa 1.5d	sf468	860	36.7	1488	105000	diesel
Inrets	253	Volkswagen	Passat CLD	3531y2a	1180	50.0	1896	61000	diesel
Inrets	254	Renault	21 TD	b4880s	1185	64.7	2068	89000	diesel
Inrets	256	Ford	Mondeo td	bappe	1277	65.0	1753	43000	diesel
Inrets	257	Renault	Clio 1.9d	b57605	905	47.8	1870	126000	diesel
Inrets	260	Opel	Corsa Viva	cbb408nb	905	49.2	1488	19000	diesel
Inrets	261	Citroen	BX 19TRD	xbxc	990	52.2	1905	117000	diesel
Tüv	102	Nissan	Bluebird	413001	1260	49.0	1938	178129	diesel
Tüv	109	VW	Bus	91027	1465	37.0	1570	83837	diesel
Tüv	113	Ford	Escort	588008	910	40.0	1597	154385	diesel
Tüv	115	Audi	80 TDI	535013	1270	66.0	1896	144677	diesel
Tüv	128	Mazda	323	343001	925	40.0	1708	123128	diesel
Tüv	133	MB	250 D	338117	1400	66.0	2500	56843	diesel
Tüv	152	Audi	100 D	326001	1210	51.0	1962	153038	diesel
Tüv	187	Nissan	Sunny	480003	1055	55.0	1974	123616	diesel
Tüv	188	VW	Golf	614081	900	40.0	1570	180590	diesel
Tüv	191	MB	300 D	375058	1440	80.0	2975	99070	diesel
Tüv	193	Toyotoa	Corolla	0	1125	53.0	1975	236393	diesel
Tüv	195	VW	Golf	769022	974	44.0	1598	69873	diesel

Tüv	198	Volvo	744	411001	1420	60.0	2335	263828	diesel

Additional parameters and signification of the figures

veh. choice:	fuel:	catalyst:	fuel system:	charging syst.:	veh. provenance:
1: random	1: petrol	0 : without	1: carburettor	0: without	1 : private owner
2: German AU	2: diesel	1 : uncont./oxyd. cat.	2: electr. carb.	1: turbo	2 : rental company
3: high emitter	3: LPG	3: 3-w catalyst	3: single pt inj.	3: comprex	3: company veh.
4 from RS test			4: multi pt inj.	4 : mechanical	4: garage
					5: other

gear box:	EGR, air pump:
1: manual	0: without
2: automatic	1 : with

lab.	nber	choice	fuel	1st driv. date	local emis. standard	nber gears	gear box	cat	fuel syst.	EGR	air pump	charging syst.	veh. prov.	number of tests long	sh.	idle	st.
Inrets	228	1	1	jun-85	1503	5	1	0	1	0	0	0	1	14	12	6	2
Inrets	229	1	1	oct-87	1504	5	1	0	1	0	0	0	1	14	6	6	2
Inrets	230	1	1	mar-92	1504	5	1	0	1	0	0	0	1	7	3	3	1
Inrets	233	1	1	fév-91	1504	5	1	0	1	0	0	0	1	7	3	3	1
Inrets	236	1	1	sep-90	1504	5	1	0	1	0	0	0	1	7	6	3	1
Inrets	238	1	1	nov-92	1504	5	1	0	1	0	0	0	1	14	12	6	2
Inrets	239	1	1	mar-89	1504	5	1	0	1	0	0	0	1	14	12	6	2
Inrets	241	1	1	aoû-90	1504	5	1	0	3	0	0	0	1	7	6	3	1
Inrets	245	1	1	fév-89	1504	4	1	0	1	0	0	0	1	7	6	3	1
Inrets	251	1	1	nov-90	1504	4	1	0	1	0	0	0	1	7	6	3	1
Inrets	276	4	1	jan-85	1504	5	1	0	1	0	0	0	1	14	12	6	2
Inrets	278	4	1	jan-87	1504	5	1	0	1	0	0	0	1	14	6	6	2
Inrets	281	4	1	jun-90	1504	5	1	0	1	0	0	0	1	14	12	6	2
Inrets	284	4	1	fév-87	1504	4	1	0	1	0	0	0	1	14	6	6	2
Inrets	286	4	1	oct-87	1504	5	1	0	1	0	0	0	3	14	12	6	2
Inrets	289	4	1	sep-88	1504	5	1	0	1	0	0	0	1	14	12	6	2
Inrets	291	4	1	jan-89	1504	5	1	0	1	0	0	0	1	14	6	6	2
Inrets	293	4	1	déc-85	1504	5	1	0	1	0	0	0	1	7	3	3	1
Inrets	294	4	1	sep-91	1504	5	1	0	1	0	0	0	1	14	6	6	2
Lat	4	1	1	jan-92	1882/90-88/76/EEC	5	1	2	2	0	0	0	1	14	6	4	2
Lat	9	1	1	jan-92	1882/90-88/76/EEC	5	1	2	2	0	0	0	1	14	6	4	2
Lat	10	1	1	sep-89	83/351/EEC	5	1	0	1	0	0	0	1	14	6	4	2
Lat	23	1	1	oct-90	1882/90-89/458/EEC	5	1	2	2	0	0	0	1	7	3	2	1
Lat	59	4	1	déc-91	1882/90-88/76/EEC	5	1	2	1	0	0	0	1	7	3	2	1
Lat	61	4	1	mar-90	1882/90-89/458/EEC	5	1	2	1	0	0	0	1	14	6	4	2
Tno	556	4	1	fév-92	ECE 83	5	1	0	1	0	0	0	1	7	3	2	1
Trl	2	4	1	-92	83/351	5	1	0	4	0	0	0	1	14	12	4	2
Trl	3	4	1	-93	83/351	4	1	2	2	0	0	0	1	14	12	4	2
Trl	6	4	1	-91	83/351	5	1	0	1	0	0	0	1	14	6	4	2
Trl	7	4	1	-92	83/351	5	1	0	3	0	0	0	1	14	6	4	2
Trl	8	4	1	-93	83/351	5	1	2	1	0	0	0	1	14	12	4	2
Trl	11	4	1	-89	83/351	5	1	0	4	0	0	0	1	7	6	2	1
Trl	12	4	1	-90	83/351	5	1	0	1	0	0	0	1	7	6	2	1
Trl	13	4	1	-91	83/351	5	1	0	1	0	0	0	1	7	6	2	1
Trl	14	4	1	-90	83/351	5	1	2	1	0	0	0	1	14	12	4	2
Trl	15	4	1	-92	83/351	5	1	0	1	0	0	0	1	7	3	2	1
Trl	16	4	1	-91	83/351	-1	2	0	1	0	0	0	1	7	3	2	1
Trl	17	4	1	-90	83/351	5	1	0	1	0	0	0	1	7	3	2	1
Trl	18	4	1	-91	83/351	5	1	0	1	0	0	0	1	7	6	2	1
Trl	19	4	1	-89	83/351	5	1	0	1	0	0	0	1	7	3	2	1
Trl	20	4	1	-91	83/351	5	1	2	1	0	0	0	1	7	6	2	1

lab.	nber	choice	fuel	1st driv. date	local emis. standard	nber gears	gear box	cat	fuel syst.	EGR	air pump	charging syst.	veh. prov.	number of tests long	sh.	idle	st.
Inrets	227	1	1	oct-94	1507	5	1	3	3	0	0	0	2	7	6	3	1
Inrets	247	1	1	avr-95	1507	5	1	3	3	0	0	0	1	7	3	3	1
Inrets	248	1	1	déc-92	1507	5	1	3	3	0	0	0	1	14	6	6	2
Inrets	249	1	1	oct-92	1507	5	1	3	3	0	0	0	1	7	6	3	1
Inrets	262	1	1	oct-93	1507	5	1	3	3	0	0	0	1	7	3	3	1
Inrets	264	1	1	nov-92	1507	5	1	3	3	0	0	0	1	14	12	6	2
Inrets	265	1	1	avr-93	1507	5	1	3	3	0	0	0	1	14	6	6	2
Inrets	266	1	1	déc-93	1507	5	1	3	3	0	0	0	1	7	6	3	1
Inrets	267	1	1	oct-93	1507	3	2	3	3	0	0	0	1	7	6	3	1
Inrets	268	1	1	mar-95	1507	5	1	3	3	0	0	0	1	7	6	3	1
Inrets	271	1	1	avr-94	1507	5	1	3	3	0	0	0	1	7	6	3	1
Inrets	272	1	1	aoû-93	1507	5	1	3	3	0	0	0	1	7	3	3	1
Inrets	273	1	1	sep-93	1507	5	1	3	3	0	0	0	1	7	6	3	1
Inrets	274	1	1	mai-95	1507	5	1	3	3	0	0	0	1	7	3	3	1
Inrets	275	1	1	oct-94	1507	5	1	3	3	0	0	0	1	7	6	3	1
Inrets	280	4	1	sep-94	1507	5	1	3	3	0	0	0	1	7	3	3	1
Lat	1	1	1	jan-92	1882/90-89/458/EEC	5	1	3	4	0	0	0	1	14	6	4	2
Lat	2	1	1	mar-91	1882/90-89/458/EEC	5	1	3	3	0	0	0	1	14	6	4	2
Lat	3	1	1	jun-92	1882/90-88/76/EEC	5	1	3	2	0	0	0	1	14	6	4	2
Lat	5	1	1	déc-92	1882/90-88/76/EEC	5	1	3	3	0	0	0	1	14	6	4	2
Lat	6	1	1	déc-92	1882/90-88/76/EEC	5	1	3	4	0	0	0	1	14	6	4	2
Lat	7	1	1	mar-93	1882/90-91/441/EEC	5	1	3	3	0	0	0	1	14	6	4	2
Lat	8	1	1	jan-92	88/76/EEC	5	1	3	4	0	0	0	1	7	3	2	1
Lat	11	1	1	mai-93	1882/90-91/441/EEC	5	1	3	3	0	0	0	2	7	3	2	1
Lat	12	1	1	jan-94	1882/90-91/441/EEC	5	1	3	3	0	0	0	1	14	6	4	2
Lat	13	1	1	jul-92	1882/90-89/458/EEC	5	1	3	4	0	0	0	1	7	3	2	1
Lat	14	1	1	jan-93	1882/90-91/441/EEC	5	1	3	3	0	0	0	1	7	3	2	1
Lat	15	1	1	oct-91	1882/90-89/458/EEC	5	1	3	3	0	0	0	1	7	3	2	1
Lat	16	1	1	jun-94	1882/90-91/441/EEC	5	1	3	3	0	0	0	1	14	6	4	2
Lat	17	1	1	oct-92	1882/90-89/458/EEC	5	1	3	2	0	0	0	1	7	3	2	1
Lat	18	1	1	jul-91	1882/90-89/458/EEC	5	1	3	3	0	0	0	1	7	3	2	1
Lat	19	1	1	nov-91	1882/90-88/76/EEC	5	1	3	4	1	0	0	1	14	6	4	2
Lat	20	1	1	déc-92	1882/90-89/458/EEC	5	1	3	4	0	0	0	1	7	3	2	1
Lat	21	1	1	nov-92	1882/90-88/76/EEC	5	1	3	2	0	0	0	1	14	6	4	2
Lat	22	1	1	sep-95	1882/90-91/441/EEC	5	1	3	4	0	0	0	1	7	3	2	1
Lat	24	1	1	déc-87	88/76/EEC	5	1	3	4	0	0	0	1	7	3	2	1
Lat	25	1	1	jun-92	1882/90-89/458/EEC	5	1	3	3	0	0	0	1	14	6	4	2
Lat	26	1	1	mai-93	1882/90-91/441/EEC	5	1	3	3	0	0	0	2	7	3	2	1
Lat	27	1	1	jul-92	1882/90-88/76/EEC	5	1	3	4	0	0	0	1	7	3	2	1
Lat	28	1	1	jun-92	1882/90-88/76/EEC	5	1	3	4	0	0	0	1	7	3	2	1
Lat	29	1	1	avr-91	1882/90-88/76/EEC	5	1	3	4	0	0	0	1	7	3	2	1
Lat	30	1	1	jun-91	1882/90-88/76/EEC	5	1	3	4	0	0	0	1	14	6	4	2
Lat	31	1	1	sep-95	1882/90-91/441/EEC	5	1	3	3	0	0	0	1	7	3	2	1
Lat	32	1	1	avr-91	1882/90-89/458/EEC	5	1	3	3	0	0	0	1	7	3	2	1
Lat	33	1	1	nov-93	1882/90-91/441/EEC	5	1	3	3	0	0	0	1	7	3	2	1
Lat	34	1	1	nov-93	1882/90-91/441/EEC	5	1	3	3	0	0	0	1	7	3	2	1
Lat	35	1	1	mai-93	1882/90-91/441/EEC	5	1	3	3	0	0	0	2	7	3	2	1
Lat	36	1	1	déc-94	1882/90-91/441/EEC	5	1	3	3	0	0	0	1	7	3	2	1
Lat	37	1	1	jan-96	1882/90-91/441/EEC	5	1	3	3	0	0	0	1	7	3	2	1
Lat	38	1	1	déc-92	1882/90-89/458/EEC	5	1	3	4	0	0	0	1	7	3	2	1
Lat	39	1	1	déc-94	1882/90-91/441/EEC	5	1	3	3	0	0	0	1	14	6	4	2
Lat	40	1	1	jan-92	1882/90-89/458/EEC	5	1	3	3	0	0	0	1	7	3	2	1
Lat	41	1	1	-	1882/90-91/441/EEC	5	1	3	4	0	0	0	3	7	3	2	1
Lat	42	1	1	déc-92	1882/90-89/458/EEC	5	1	3	3	0	0	0	1	7	3	2	1
Lat	43	1	1	déc-90	1882/90-89/458/EEC	5	1	3	3	0	0	0	1	7	3	2	1
Lat	44	1	1	sep-91	1882/90-89/458/EEC	5	1	3	4	0	0	0	1	7	3	2	1

lab.	nber	choice	fuel	1st driv. date	local emis. standard	nber gears	gear box	cat	fuel syst.	EGR	air pump	charging syst.	veh. prov.	number of tests long	sh.	idle	st.
Lat	45	1	1	-	1882/90-91/441/EEC	5	1	3	4	0	0	0	3	7	3	2	1
Lat	46	1	1	-	1882/90-91/441/EEC	5	1	3	3	0	0	0	3	14	6	4	2
Lat	47	1	1	-	1882/90-91/441/EEC	5	1	3	4	0	0	0	3	7	3	2	1
Lat	48	1	1	mar-96	94/12/EEC	5	1	3	4	0	0	0	3	7	3	2	1
Lat	49	1	1	mar-95	1882/90-91/441/EEC	5	1	3	4	0	0	0	1	7	3	2	1
Lat	50	1	1	mar-95	1882/90-91/441/EEC	5	1	3	3	0	0	0	1	7	3	2	1
Lat	51	1	1	jun-92	1882/90-88/76/EEC	5	1	3	4	0	0	0	1	7	3	2	1
Lat	52	1	1	mar-96	1882/90-91/441/EEC	5	1	3	3	0	0	0	1	7	3	2	1
Lat	53	1	1	déc-92	1882/90-89/458/EEC	5	1	3	3	0	0	0	1	7	3	2	1
Lat	54	1	1	mar-93	1882/90-91/441/EEC	5	1	3	3	0	0	0	1	7	3	2	1
Lat	55	4	1	aoû-92	1882/90-88/76/EEC	5	1	3	3	0	0	0	1	14	6	4	2
Lat	56	4	1	nov-91	1882/90-88/76/EEC	5	1	3	4	0	0	0	1	14	6	4	2
Lat	57	4	1	mai-93	1882/90-91/441/EEC	5	1	3	2	0	0	0	1	7	3	2	1
Lat	58	4	1	oct-91	1882/90-89/458/EEC	5	1	3	4	0	0	0	1	14	6	4	2
Lat	60	4	1	nov-93	1882/90-91/441/EEC	5	1	3	4	0	0	0	1	7	3	2	1
Lat	62	4	1	jan-92	1882/90-88/76/EEC	5	1	3	2	0	0	0	1	7	3	2	1
Lat	63	1	1	jun-92	1882/90-88/76/EEC	5	1	3	4	0	0	1	1	7	3	2	1
Lat	64	1	1	jan-92	1882/90-88/76/EEC	5	1	3	3	0	0	0	1	7	3	2	1
Lat	65	4	1	jan-95	1882/90-91/441/EEC	5	1	3	4	0	0	0	1	7	3	2	1
Lat	66	1	1	jul-92	1882/90-89/458/EEC	5	1	3	3	0	0	0	1	7	3	2	1
Lat	67	4	1	jul-95	1882/90-91/441/EEC	5	1	3	3	0	0	0	2	7	3	2	1
Lat	68	1	1	avr-91	1882/90-88/76/EEC	5	1	3	3	0	0	0	1	7	3	2	1
Lat	69	1	1	jul-94	1882/90-91/441/EEC	5	1	3	2	0	0	0	1	14	6	4	2
Tno	501	1	1	oct-94	E2	5	1	3	4	1	1	0	1	14	6	4	2
Tno	502	1	1	jan-95	E2	5	2	3	4	0	1	0	1	7	3	2	1
Tno	503	3	1	mai-92	U9	5	1	3	4	0	0	0	1	7	3	2	1
Tno	504	1	1	fév-95	94/12	5	1	3	4	1	0	0	5	7	3	2	1
Tno	505	1	1	mai-90	U9	5	1	3	4	1	0	0	1	7	3	2	1
Tno	506	3	1	fév-90	U9	5	1	3	3	1	0	0	1	7	3	2	1
Tno	507	1	1	jun-94	E2	5	1	3	3	0	0	0	1	7	3	2	1
Tno	508	1	1	jun-94	E2	4	2	3	3	1	0	0	1	7	3	2	1
Tno	509	3	1	jul-91	U9	5	1	3	4	1	0	0	1	7	3	2	1
Tno	510	3	1	mai-90	U9	5	1	3	2	1	1	0	1	7	3	2	1
Tno	511	1	1	nov-94	E2	5	1	3	4	1	1	0	1	7	3	2	1
Tno	512	1	1	jan-94	E2	5	1	3	4	1	0	0	1	7	3	2	1
Tno	513	1	1	aoû-94	E2	5	1	3	3	0	0	0	1	7	3	2	1
Tno	514	1	1	jun-94	E2	5	1	3	3	0	0	0	1	7	3	2	1
Tno	515	1	1	fév-94	E2	4	2	3	4	1	0	0	1	7	3	2	1
Tno	516	1	1	aoû-94	E2	5	1	3	4	0	0	0	1	7	3	2	1
Tno	517	3	1	mai-90	U9	4	1	3	3	0	0	0	1	7	3	2	1
Tno	518	1	3	nov-94	E2	5	1	3	3	1	0	0	1	7	3	2	1
Tno	519	1	3	jun-94	E2	5	1	3	3	0	0	0	1	7	3	2	1
Tno	520	1	3	jun-94	E2	4	2	3	3	1	0	0	1	7	3	2	1
Tno	521	1	3	jul-94	E2	5	1	3	4	1	1	0	1	7	3	2	1
Tno	522	1	3	aoû-94	E2	5	1	3	3	0	0	0	1	7	3	2	1
Tno	523	1	3	aoû-94	E2	5	1	3	4	0	0	0	1	7	3	2	1
Tno	526	3	1	mar-90	U9	5	1	3	4	0	0	0	1	14	6	4	2
Tno	527	3	1	jan-92	U9	5	1	3	3	0	0	0	1	14	6	4	2
Tno	528	3	1	fév-92	U9	5	1	3	4	0	0	0	1	14	6	4	2
Tno	529	3	3	nov-94	94/12	5	1	3	4	0	0	0	1	14	6	4	2
Tno	525	3	3	nov-94	94/12	5	1	3	4	0	0	0	1	7	3	2	1
Tno	530	1	1	avr-87	K6	5	1	3	4	0	0	0	1	14	6	4	2
Tno	531	1	1	mar-91	U9	5	1	3	4	0	0	0	1	7	3	2	1
Tno	532	1	1	mai-84	15-avr	5	1	3	4	0	0	0	1	7	3	2	1
Tno	533	1	1	aoû-90	U9	5	1	3	3	0	0	0	1	7	3	2	1
Tno	534	1	1	jun-90	U9	5	1	3	3	1	0	0	1	7	3	2	1

lab.	nber	choice	fuel	1st driv. date	local emis. standard	nber gears	gear box	cat	fuel syst.	EGR	air pump	charging syst.	veh. prov.	number of tests long	sh.	idle	st.
Tno	535	1	1	aoû-91	U9	5	1	3	4	0	0	0	1	7	3	2	1
Tno	536	1	1	fév-90	U9	5	1	3	4	0	0	0	1	7	3	2	1
Tno	537	1	3	jun-93	E2	5	1	3	4	0	0	0	0	7	3	2	1
Tno	538	1	3	jun-92	U9	5	1	3	3	0	0	0	1	7	3	2	1
Tno	539	1	3	jan-89	K6	5	1	3	3	0	0	0	1	7	3	2	1
Tno	540	1	1	mai-89	K6	5	1	3	4	0	0	0	1	14	6	4	2
Tno	541	3	1	jul-91	U9	4	2	3	4	0	0	0	1	14	6	4	2
Tno	542	3	1	jan-91	U9	5	1	3	4	0	0	0	1	14	6	4	2
Tno	551	4	3	mai-92	U9	5	1	3	3	0	0	0	1	7	3	2	1
Tno	552	4	1	aoû-92	U9	5	1	3	3	0	0	0	1	7	3	2	1
Tno	553	4	1	mai-95	E2	5	1	3	4	0	1	0	1	7	3	2	1
Tno	554	4	3	jan-95	E2	5	1	3	4	0	0	0	3	7	3	2	1
Tno	555	4	3	jan-93	E2	4	2	3	3	1	0	0	3	7	3	2	1
Tno	557	4	3	jan-92	U9	5	1	3	2	0	0	0	1	7	3	2	1
Tno	558	4	1	jun-93	E2	5	1	3	4	1	0	0	1	7	3	2	1
Tno	559	4	1	jan-94	E2	5	1	3	3	0	0	0	1	14	6	4	2
Tno	560	4	1	oct-90	U9	5	1	3	2	1	1	0	1	14	6	4	2
Tno	561	4	1	déc-92	U9	5	1	3	3	0	0	0	1	7	3	2	1
Tno	562	4	1	mar-94	E2	5	1	3	3	0	0	0	1	7	3	2	1
Tno	563	4	1	aoû-95	E2	5	1	3	3	0	0	0	2	7	3	2	1
Tno	564	4	1	nov-92	E2	5	1	3	3	0	0	0	1	7	3	2	1
Tno	565	4	3	aoû-94	E2	5	1	3	3	0	0	0	3	7	3	2	1
Tno	566	4	1	sep-91	U9	5	1	3	2	0	0	0	1	7	3	2	1
Trl	1	4	1	-92	91/441	5	1	3	2	0	0	0	1	14	6	4	2
Trl	4	4	1	-92	91/441	-1	2	3	4	0	0	0	5	14	6	4	2
Trl	5	4	1	-93	91/441	5	1	3	4	0	0	0	1	14	6	4	2
Trl	9	4	1	-93	91/441	5	1	3	4	0	0	0	1	14	12	4	2
Trl	10	4	1	-92	91/441	5	1	3	4	0	0	0	1	7	6	2	1
Tüv	7	1	1	sep-93	E2	-1	2	3	4	0	0	0	1	7	3	2	1
Tüv	8	1	1	sep-93	E2	5	1	3	4	0	0	0	1	7	6	2	1
Tüv	11	1	1	oct-90	XXIII	5	1	3	4	0	0	0	1	7	6	2	1
Tüv	12	1	1	fév-94	E2	5	1	3	4	0	0	0	3	7	6	2	1
Tüv	13	1	1	avr-91	XXIII	5	1	3	4	0	0	0	1	7	6	2	1
Tüv	15	1	1	avr-92	XXIII	5	1	3	3	0	0	0	1	7	6	2	1
Tüv	16	1	1	jul-94	E2	5	1	3	3	0	0	0	1	7	6	2	1
Tüv	17	1	1	déc-94	E2	5	1	3	3	0	0	0	1	7	6	2	1
Tüv	18	1	1	déc-94	E2	5	1	3	4	0	0	0	1	7	3	2	1
Tüv	20	1	1	jul-94	E2	5	1	3	3	0	0	0	1	7	6	2	1
Tüv	21	1	1	fév-93	E2	5	1	3	3	0	0	0	1	7	6	2	1
Tüv	23	1	1	mai-94	E2	-1	2	3	4	0	0	0	1	7	6	2	1
Tüv	24	1	1	oct-94	E2	5	1	3	3	0	0	0	1	7	6	2	1
Tüv	25	1	1	jun-94	E2	5	1	3	4	0	0	0	1	7	6	2	1
Tüv	28	1	1	jul-91	XXIII	4	1	3	3	0	0	0	1	7	6	2	1
Tüv	29	1	1	aoû-94	E2	-1	2	3	4	0	0	0	1	7	3	2	1
Tüv	30	1	1	jun-94	E2	5	1	3	4	0	0	0	1	7	6	2	1
Tüv	32	1	1	déc-90	XXIII	5	1	3	4	0	0	0	1	7	6	2	1
Tüv	33	1	1	jun-94	E2	5	1	3	3	0	0	0	1	7	3	2	1
Tüv	34	1	1	jun-92	XXIII	5	1	3	3	0	0	0	1	7	3	2	1
Tüv	40	1	1	aoû-94	E2	-1	2	3	4	0	0	0	1	7	3	2	1
Tüv	45	1	1	avr-94	E2	5	1	3	4	0	0	0	1	7	6	2	1
Tüv	50	1	1	avr-93	E2	-1	2	3	4	0	0	0	3	7	6	2	1
Tüv	52	1	1	oct-85	XXIII	5	1	3	4	0	0	0	1	7	3	2	1
Tüv	57	1	1	fév-89	XXIII	5	1	3	4	0	0	0	1	7	3	2	1
Tüv	58	1	1	déc-89	XXIII	5	1	3	4	0	0	0	1	14	9	4	2
Tüv	59	1	1	fév-91	XXIII	4	1	3	3	0	0	0	1	7	6	2	1
Tüv	60	1	1	jul-92	E2	5	1	3	4	0	0	0	1	7	3	2	1
Tüv	61	1	1	mai-87	XXIII	5	1	3	4	0	0	0	3	7	3	2	1

Tüv	62	1	1	nov-91	XXIII	-1	2	3	4	0	0	0	1	7	3	2	1
Tüv	65	1	1	mar-92	XXIII	5	1	3	3	0	0	0	1	7	3	2	1
Tüv	66	1	1	mai-94	E2	5	1	3	4	0	0	0	1	7	3	2	1
lab.	nber	cho ice	fu el	1st driv. date	local emis. standard	nber gears	gear box	cat	fuel syst.	EGR	air pump	char ing syst.	veh. prov.	long (number of tests)	sh.	idle	st.
Tüv	68	1	1	sep-92	XXIII	-1	2	3	4	0	0	0	1	7	6	2	1
Tüv	69	1	1	avr-94	E2	5	1	3	4	0	0	0	1	7	6	2	1
Tüv	81	1	1	jun-91	XXIII	5	1	3	3	0	0	0	1	14	6	4	2
Tüv	86	1	1	mai-91	XXIII	5	1	3	3	0	0	0	1	7	6	2	1
Tüv	87	1	1	sep-92	XXIII	5	1	3	4	1	0	0	1	7	6	2	1
Tüv	88	1	1	déc-92	E2	5	1	3	4	0	0	0	1	7	6	2	1
Tüv	93	1	1	avr-93	E2	5	1	3	3	0	0	0	1	7	3	2	1
Tüv	94	1	1	sep-91	XXIII	5	1	3	4	0	0	0	1	7	3	2	1
Tüv	103	2	1	oct-89	XXIII	5	1	3	4	0	0	0	1	14	6	4	2
Tüv	110	2	1	fév-87	XXIII	5	1	3	4	0	0	0	1	14	6	4	2
Tüv	111	2	1	fév-91	XXIII	5	1	3	4	0	0	0	1	14	6	4	2
Tüv	112	2	1	nov-90	XXIII	5	1	3	4	0	0	0	3	14	6	4	2
Tüv	118	2	1	mai-91	XXIII	5	1	3	4	0	0	0	1	14	6	4	2
Tüv	132	2	1	mar-91	XXIII	5	1	3	4	0	0	0	1	14	6	4	2
Tüv	165	2	1	sep-92	E2	5	1	3	3	0	0	0	1	14	6	4	2
Tüv	167	2	1	aoû-88	XXV	5	1	3	3	0	0	0	1	14	6	4	2
Tüv	168	2	1	jul-90	XXIII	5	1	3	3	0	0	0	1	14	6	4	2
Tüv	169	2	1	oct-90	XXIII	5	1	3	4	0	0	0	1	14	6	4	2
Tüv	170	2	1	oct-92	E2	5	1	3	3	0	0	0	1	14	6	4	2
Tüv	171	2	1	nov-90	XXIII	5	1	3	4	0	0	0	1	14	6	4	2
Tüv	172	2	1	oct-90	XXIII	5	1	3	4	0	0	0	1	14	6	4	2
Tüv	179	2	1	jul-88	XXIII	4	1	3	4	0	0	0	1	14	6	4	2
Tüv	194	2	1	fév-91	XXIII	5	1	3	3	1	0	0	1	14	6	4	2
Tüv	197	2	1	oct-88	XXIII	5	1	3	3	0	0	0	1	14	6	4	2
Inrets	234	1	2	sep-89	1504	5	1	0	3	0	0	0	1	7	6	2	1
Inrets	235	1	2	jun-93	1507	5	1	0	3	0	0	0	1	7	3	2	1
Inrets	237	1	2	nov-93	1507	5	1	0	3	0	0	1	1	7	6	2	1
Inrets	242	1	2	mai-95	1507	5	1	0	3	0	0	0	1	7	3	2	1
Inrets	243	1	2	fév-95	1507	5	1	0	3	0	0	0	1	7	3	2	1
Inrets	244	1	2	oct-94	1507	5	1	0	3	0	0	1	1	7	3	2	1
Inrets	246	1	2	oct-94	1507	5	1	0	3	0	0	0	1	7	3	2	1
Inrets	250	1	2	aoû-94	1507	5	1	0	3	0	0	0	1	7	3	2	1
Inrets	252	1	2	jul-89	1504	5	1	0	3	0	0	0	1	7	6	2	1
Inrets	253	1	2	sep-91	1506	5	1	0	3	0	0	0	1	7	3	2	1
Inrets	254	1	2	jun-90	1504	5	1	0	3	0	0	1	1	7	3	2	1
Inrets	256	1	2	nov-93	1507	5	1	0	3	0	0	1	1	7	6	2	1
Inrets	257	1	2	jan-91	1506	5	1	0	3	0	0	0	1	7	6	2	1
Inrets	260	1	2	déc-94	1507	5	1	0	3	0	0	1	1	7	6	2	1
Inrets	261	1	2	jul-88	1504	5	1	0	3	0	0	0	1	7	3	2	1
Tüv	102	2	2	oct-86	XXV	5	1	0	4	0	0	0	1	7	3	1	0
Tüv	109	2	2	jun-82	no	4	1	0	4	0	0	0	1	14	6	2	0
Tüv	113	2	2	oct-85	XXV	5	1	0	4	0	0	0	1	14	6	2	0
Tüv	115	2	2	jan-93	E2	5	1	2	4	0	0	1	1	7	3	1	0
Tüv	128	2	2	avr-87	XXV	5	1	0	4	0	0	0	1	7	3	1	0
Tüv	133	1	2	mar-93	E2	5	1	0	4	0	0	0	1	7	3	1	0
Tüv	152	2	2	mar-83	XXIVa	5	1	0	4	0	0	0	1	14	6	2	0
Tüv	187	1	2	jul-92	XXIII	5	1	0	4	1	0	0	1	7	3	1	0
Tüv	188	1	2	aoû-87	XXIII	5	1	0	4	0	0	0	1	7	6	1	0
Tüv	191	1	2	jun-88	XXV	-1	2	0	4	0	0	0	1	7	3	1	0
Tüv	193	2	2	jan-93	E2	5	1	2	4	0	0	0	3	7	3	1	0
Tüv	195	2	2	jan-91	XXIII	5	1	2	4	0	0	1	1	7	3	1	0
Tüv	198	1	2	mar-86	XXV	5	1	0	4	0	0	0	1	7	3	1	0

Annex 8: Short names of the variables

(to be used in annexes 9-11)

See also the annex 6 for the description of parameters

Vehicle data

lab	laboratory
numveh	lab. veh. number
mass	mass (kg)
power	power (kW)
iecap	engine capacity (cm^3)
iftype	fuel type

	CO	st	emission according to standard
HC + NOx =	HCNOx		
	NOx		
	HC		
	PM		

icyst	type of standard cycle (1 : ECE15, 2 : NEDC, 3 : FTP)
icat	Catalyst
ifuel	fuel type
iegr	EGR
tairp	air pump
icharg	charging system
kmage	mileage
choice	choice type
iatsc	analyser type for short cycles (1 : garage, 2 : laboratory)

(See age variable and standardized emission rates at the end)

Long cycles

maint1	type of maintenance (as received)
inertw1	inertia weight (as received)
inert1	type of inertia (1 : only normal and simple ; 3 = only simple)
maint2	type of maintenance (after maintenance)

ABC :

A=pres	=	ambient pressure	B=Ec	=	ECE 15 cold	C= r	= as received
temp	=	" temp.	EU	=	EUDC	m	= after maintenance
hum	=	" humidity	NE	=	NEDC		
dist	=	distance	Eh	=	ECE 15 hot		
CO	=		mF	=	modem IM free flow urban		
CO2	=		mS	=	modem IM slow urban		
HC	=		mR	=	Modem IM road		
NOx	=		mM	=	modem IM motorway		
PM	=		mw	=	modem IM weighted		
FC	=						
pres	=	Ambient pressure					

Short cycles

ABCDEF =

A =	g =	garage analyser concentration
	l =	laboratory analyser concentration
	(nothing)	

B =	(nothing)	= emission (g/km) for C polluant		C =	pres = ambient pressure
	a	= raw average concentration			temp = ambient temperature
	5	= raw conc. percentile	50		hum = ambient humidity
	6	=	60		CO
	7	=	70		C2 = CO2
	8	=	80		HC
	9	=	90		NO = NOx
	m	=	100 (maximum)		PM
	da	= diluted average concentration			FC

D =	T1	=	TÜV-A 1	E =	1 =	normal inertia	F =	r =	as received
	T2	=	TÜV-A 2		2 =	simple inertia		m =	after maintenance
	ms	=	modem IM short						

idle... 50/7

ABCD =

A =	gc	=	garage analyser concentration
	lc	=	laboratory " "
(nothing)			

B=	pres	ambient pressure	C =	i3	=	idle 3000
	temp	ambient temperature		id	=	idle

hum	ambient humidity	fa	=	free acceleration
rpm	= engine speed	au	=	autonat
lda	= Λ	57	=	50/7
tyl	= type of assessment of Λ			
CO				
C2	= CO2			
HC				
NO	= NOx			
FC				
Op	= opacity			

C =	aoa	fa	average opacity in acceleration
	aos		" " in steady state
	ao		" " globally
	mo		maximal opacity
	esmo		engine speed of max opacity
	mof		maximal opacity flow
	esmof		enjine speed of maximum opacity flow

D = r = as received
m = after maintenance

Last vehicle data

ABC

A =	age	= age of the vehicle (year)
	CO	
	HCNO	= HC + NOx
	NOx	
	HC	
	PM	
	max	= maximal figure for all pollutants

B = (nothing)
str = actual emission on standard cycle rated by emission standard

C = r = as received
m = after maintenance

Annex 9: Correlation for the gasoline 3 way calalyst vehicles

	MASS	POWER	IECAP	KMAGE	PRESECR	TEMPECR	HUMECR	AGER
MASS	1	0.872	0.857	0.06	0.019	0.257	-0.163	-0.119
POWER	0.872	1	0.904	0.145	0.016	0.234	-0.111	0.01
IECAP	0.857	0.904	1	0.191	0.076	0.257	-0.169	0.073
KMAGE	0.06	0.145	0.191	1	0.157	0.083	0.123	0.77
PRESECR	0.019	0.016	0.076	0.157	1	0.249	0.286	0.121
TEMPECR	0.257	0.234	0.257	0.083	0.249	1	-0.097	0.042
HUMECR	-0.163	-0.111	-0.169	0.123	0.286	-0.097	1	0.083
AGER	-0.119	0.01	0.073	0.77	0.121	0.042	0.083	1
COMWR	-0.286	-0.3	-0.287	0.341	0.209	-0.072	0.277	0.277
CO2MWR	0.803	0.794	0.867	0.127	0.102	0.401	-0.131	0.124
HCMWR	-0.283	-0.262	-0.283	0.393	0.227	-0.233	0.501	0.3
NOXMWR	-0.021	-0.109	-0.027	0.557	0.146	0.06	0.168	0.456
FCMWR	0.795	0.786	0.861	0.157	0.123	0.403	-0.11	0.148
CONER	-0.161	-0.148	-0.167	0.187	0.089	-0.392	0.146	0.158
CO2NER	0.818	0.817	0.825	0.1	0.08	0.326	-0.157	0.047
HCNER	0.03	0.118	0.061	0.343	0.083	-0.241	0.111	0.331
NOXNER	-0.072	-0.049	0.009	0.528	0.139	0.058	0.149	0.514
FCNER	0.823	0.793	0.795	0.19	0.149	0.335	-0.155	0.025
PREST21R	0.001	0.032	0.058	0.138	1	0.23	0.216	0.176
TEMPT21R	0.285	0.265	0.266	0.058	0.23	1	-0.116	0.044
HUMT21R	-0.191	-0.133	-0.204	0.104	0.216	-0.116	1	0.067
AGER	-0.119	0.01	0.073	0.77	0.176	0.044	0.067	1
COT21R	-0.17	-0.194	-0.187	0.366	0.139	-0.124	0.247	0.269
GACOT21R	-0.262	-0.312	-0.289	0.211	0.155	-0.181	0.124	0.085
G5COT21R	-0.199	-0.251	-0.233	0.397	0.303	-0.06	0.222	0.162
G6COT21R	-0.184	-0.281	-0.242	0.394	0.332	-0.034	0.19	0.173
G7COT21R	-0.19	-0.326	-0.268	0.333	0.325	-0.059	0.146	0.16
G8COT21R	-0.181	-0.322	-0.269	0.27	0.282	-0.079	0.109	0.15
G9COT21R	-0.179	-0.331	-0.255	0.3	0.268	-0.109	0.032	0.133
GMCOT21R	-0.206	-0.353	-0.249	0.258	0.162	-0.155	-0.086	0.075
LACOT21R	-0.153	-0.188	-0.172	0.059	0.12	-0.123	0.085	0.101
L5COT21R	-0.171	-0.198	-0.204	0.111	0.136	-0.173	0.202	0.089
L6COT21R	-0.162	-0.204	-0.201	0.102	0.121	-0.148	0.167	0.095
L7COT21R	-0.148	-0.204	-0.19	0.081	0.095	-0.128	0.117	0.106

	MASS	POWER	IECAP	KMAGE	PRESECR	TEMPECR	HUMECR	AGER
L8COT21R	-0.15	-0.2	-0.182	0.06	0.104	-0.121	0.088	0.107
L9COT21R	-0.141	-0.178	-0.154	0.035	0.118	-0.106	0.043	0.118
LMCOT21R	-0.093	-0.114	-0.1	-0.023	0.055	-0.071	0.001	0.022
DACOT21R	-0.168	-0.22	-0.212	0.248	0.08	-0.159	0.059	0.143
C2T21R	0.808	0.802	0.851	0.188	0.126	0.324	-0.112	0.118
GAC2T21R	0.032	-0.068	-0.063	-0.098	0.007	-0.043	-0.014	-0.12
G5C2T21R	0.068	0.045	0.048	-0.037	0.008	-0.046	-0.069	-0.081
G6C2T21R	0.077	0.061	0.055	-0.044	-0.001	-0.046	-0.063	-0.076
G7C2T21R	0.092	0.074	0.063	-0.062	-0.012	-0.04	-0.065	-0.083
G8C2T21R	0.094	0.075	0.064	-0.073	-0.02	-0.041	-0.064	-0.082
G9C2T21R	0.082	0.063	0.051	-0.079	-0.032	-0.039	-0.072	-0.075
GMC2T21R	0.044	0.031	0.012	-0.096	-0.098	-0.079	-0.112	-0.087
LAC2T21R	0.361	0.314	0.375	-0.078	-0.069	0.284	-0.392	-0.089
L5C2T21R	0.369	0.368	0.395	-0.121	-0.061	0.304	-0.361	-0.11
L6C2T21R	0.401	0.411	0.445	-0.115	-0.093	0.317	-0.363	-0.088
L7C2T21R	0.421	0.442	0.476	-0.121	-0.118	0.33	-0.364	-0.081
L8C2T21R	0.433	0.462	0.498	-0.123	-0.147	0.336	-0.366	-0.07
L9C2T21R	0.442	0.469	0.509	-0.121	-0.172	0.355	-0.384	-0.055
LMC2T21R	0.435	0.463	0.503	-0.114	-0.185	0.358	-0.402	-0.051
DAC2T21R	-0.089	-0.162	-0.183	-0.142	-0.204	-0.176	0.038	-0.099
HCT21R	-0.002	0.051	0.044	0.486	0.171	-0.102	0.179	0.431
GAHCT21R	0.186	0.324	0.356	0.469	0.251	0.211	0.013	0.495
G5HCT21R	-0.176	-0.194	-0.186	0.33	0.239	-0.122	0.195	0.148
G6HCT21R	-0.186	-0.204	-0.201	0.333	0.245	-0.146	0.18	0.154
G7HCT21R	-0.187	-0.191	-0.199	0.32	0.232	-0.197	0.125	0.16
G8HCT21R	-0.188	-0.182	-0.202	0.3	0.187	-0.231	0.075	0.151
G9HCT21R	-0.14	-0.098	-0.13	0.297	0.164	-0.234	-0.034	0.163
GMHCT21R	-0.057	0.066	-0.027	0.275	0.181	-0.141	-0.058	0.164
LAHCT21R	-0.361	-0.308	-0.36	0.353	-0.082	-0.446	0.373	0.248
L5HCT21R	-0.361	-0.337	-0.368	0.357	-0.06	-0.374	0.316	0.198
L6HCT21R	-0.346	-0.334	-0.357	0.358	-0.025	-0.384	0.289	0.205
L7HCT21R	-0.338	-0.331	-0.352	0.348	-0.018	-0.4	0.264	0.211
L8HCT21R	-0.356	-0.352	-0.37	0.34	0.004	-0.409	0.258	0.217
L9HCT21R	-0.338	-0.332	-0.343	0.348	0.026	-0.336	0.199	0.281
LMHCT21R	-0.278	-0.279	-0.294	0.306	0.037	-0.193	0.179	0.3
DAHCT21R	-0.134	-0.108	-0.118	0.463	0.127	-0.289	0.233	0.376
NOT21R	0.005	0.013	0.075	0.598	0.194	-0.014	0.115	0.565
GANOT21R	-0.495	-0.16	-0.132	0.322	0.008	-0.031	0.095	0.605
LANOT21R	-0.15	-0.214	-0.144	0.532	0.143	-0.273	0.198	0.408
L5NOT21R	-0.154	-0.201	-0.138	0.502	0.131	-0.262	0.217	0.378
L6NOT21R	-0.167	-0.214	-0.152	0.514	0.145	-0.288	0.221	0.38
L7NOT21R	-0.172	-0.225	-0.161	0.512	0.168	-0.286	0.219	0.382
L8NOT21R	-0.169	-0.228	-0.162	0.516	0.169	-0.284	0.211	0.382
L9NOT21R	-0.13	-0.202	-0.129	0.508	0.14	-0.253	0.173	0.399

	MASS	POWER	IECAP	KMAGE	PRESECR	TEMPECR	HUMECR	AGER
LMNOT21R	-0.131	-0.201	-0.151	0.431	0.122	-0.235	0.198	0.317
DANOT21R	-0.156	-0.111	-0.039	0.414	0.027	-0.193	0.213	0.387
FCT21R	0.813	0.796	0.831	0.274	0.132	0.295	-0.11	0.131
PRESMS1R	0.001	0.032	0.058	0.138	1	0.238	0.233	0.176
TEMPMS1R	0.293	0.269	0.274	0.067	0.238	1	-0.103	0.046
HUMMS1R	-0.203	-0.138	-0.212	0.104	0.233	-0.103	1	0.072
AGER	-0.119	0.01	0.073	0.77	0.176	0.046	0.072	1
COMS1R	-0.154	-0.13	-0.131	0.378	0.126	-0.231	0.306	0.297
GACOMS1R	-0.324	-0.356	-0.326	0.165	0.188	-0.243	0.21	0.11
G5COMS1R	-0.217	-0.288	-0.256	0.223	0.378	-0.095	0.27	0.126
G6COMS1R	-0.208	-0.288	-0.244	0.254	0.393	-0.099	0.254	0.161
G7COMS1R	-0.232	-0.31	-0.267	0.25	0.373	-0.146	0.225	0.178
G8COMS1R	-0.238	-0.327	-0.276	0.232	0.351	-0.166	0.192	0.176
G9COMS1R	-0.245	-0.339	-0.276	0.245	0.34	-0.185	0.155	0.197
GMCOMS1R	-0.35	-0.429	-0.344	0.164	0.104	-0.326	-0.041	0.105
LACOMS1R	-0.252	-0.255	-0.256	0.2	0.162	-0.271	0.282	0.17
L5COMS1R	-0.227	-0.239	-0.255	0.212	0.161	-0.301	0.342	0.129
L6COMS1R	-0.23	-0.237	-0.25	0.206	0.164	-0.29	0.333	0.15
L7COMS1R	-0.239	-0.239	-0.246	0.206	0.17	-0.282	0.306	0.183
L8COMS1R	-0.25	-0.248	-0.247	0.21	0.14	-0.269	0.28	0.203
L9COMS1R	-0.25	-0.251	-0.24	0.182	0.15	-0.249	0.238	0.183
LMCOMS1R	-0.229	-0.222	-0.2	0.107	0.178	-0.157	0.078	0.136
DACOMS1R	-0.192	-0.236	-0.214	0.28	0.118	-0.262	0.205	0.174
C2MS1R	0.803	0.805	0.858	0.152	0.136	0.322	-0.187	0.108
GAC2MS1R	0.015	-0.018	-0.023	-0.085	0.037	0.013	-0.046	-0.101
G5C2MS1R	0.109	0.069	0.096	-0.057	-0.042	-0.078	-0.156	-0.112
G6C2MS1R	0.126	0.087	0.103	-0.069	-0.036	-0.061	-0.139	-0.107
G7C2MS1R	0.119	0.086	0.089	-0.082	-0.032	-0.043	-0.117	-0.108
G8C2MS1R	0.112	0.089	0.081	-0.079	-0.031	-0.025	-0.096	-0.101
G9C2MS1R	0.092	0.074	0.061	-0.067	-0.027	-0.025	-0.087	-0.087
GMC2MS1R	0.033	0.029	0.025	-0.103	-0.092	-0.062	-0.149	-0.107
LAC2MS1R	0.39	0.356	0.411	-0.106	-0.044	0.264	-0.395	-0.084
L5C2MS1R	0.394	0.373	0.418	-0.146	-0.021	0.299	-0.43	-0.119
L6C2MS1R	0.405	0.389	0.432	-0.152	-0.046	0.316	-0.427	-0.109
L7C2MS1R	0.418	0.408	0.452	-0.159	-0.064	0.34	-0.417	-0.1
L8C2MS1R	0.432	0.433	0.477	-0.151	-0.086	0.359	-0.408	-0.083
L9C2MS1R	0.438	0.449	0.49	-0.137	-0.101	0.357	-0.401	-0.069
LMC2MS1R	0.422	0.433	0.474	-0.135	-0.117	0.349	-0.421	-0.066
DAC2MS1R	-0.076	-0.152	-0.146	-0.118	-0.23	-0.111	0.039	-0.131
HCMS1R	-0.219	-0.169	-0.159	0.459	0.078	-0.301	0.314	0.434
GAHCMS1R	0.135	0.296	0.33	0.489	0.172	0.162	-0.027	0.521
G5HCMS1R	-0.165	-0.147	-0.141	0.36	0.199	-0.093	0.153	0.178
G6HCMS1R	-0.159	-0.134	-0.134	0.361	0.197	-0.125	0.114	0.185
G7HCMS1R	-0.15	-0.112	-0.118	0.365	0.197	-0.155	0.078	0.202

	MASS	POWER	IECAP	KMAGE	PRESECR	TEMPECR	HUMECR	AGER
G8HCMS1R	-0.156	-0.105	-0.119	0.348	0.177	-0.193	0.035	0.197
G9HCMS1R	-0.13	-0.059	-0.084	0.314	0.157	-0.238	-0.036	0.196
GMHCMS1R	-0.141	-0.02	-0.055	0.124	-0.027	-0.256	-0.182	0.096
LAHCMS1R	-0.336	-0.318	-0.328	0.369	0.012	-0.4	0.242	0.271
L5HCMS1R	-0.323	-0.321	-0.335	0.36	-0.006	-0.399	0.307	0.192
L6HCMS1R	-0.32	-0.32	-0.333	0.355	0.01	-0.393	0.284	0.194
L7HCMS1R	-0.323	-0.326	-0.333	0.362	0.025	-0.411	0.257	0.21
L8HCMS1R	-0.328	-0.324	-0.325	0.355	0.039	-0.41	0.219	0.26
L9HCMS1R	-0.309	-0.291	-0.288	0.35	0.058	-0.371	0.16	0.314
LMHCMS1R	-0.269	-0.232	-0.225	0.296	-0.018	-0.239	0.102	0.323
DAHCMS1R	-0.28	-0.281	-0.29	0.387	0.057	-0.433	0.353	0.294
NOMS1R	-0.006	-0.008	0.069	0.537	0.117	-0.023	0.128	0.521
GANOMS1R	-0.419	-0.162	-0.111	0.27	-0.031	-0.133	0.173	0.613
LANOMS1R	-0.134	-0.213	-0.155	0.523	0.133	-0.289	0.234	0.359
L5NOMS1R	-0.156	-0.223	-0.169	0.5	0.135	-0.282	0.26	0.356
L6NOMS1R	-0.153	-0.224	-0.169	0.5	0.123	-0.275	0.267	0.364
L7NOMS1R	-0.14	-0.217	-0.161	0.519	0.122	-0.289	0.27	0.368
L8NOMS1R	-0.131	-0.21	-0.154	0.529	0.102	-0.282	0.254	0.369
L9NOMS1R	-0.097	-0.168	-0.114	0.507	0.112	-0.289	0.2	0.329
LMNOMS1R	-0.037	-0.129	-0.098	0.26	0.103	-0.073	0.043	0.161
DANOMS1R	-0.261	-0.226	-0.141	0.476	-0.061	-0.296	0.099	0.386
FCMS1R	0.803	0.797	0.837	0.237	0.14	0.289	-0.174	0.124

Table 11 : Correlation for 3 way catalyst petrol vehicles

Annex 10: Correlation for conventional gasoline vehicles

	MASS	POWER	IECAP	KMAGE	PRESECR	TEMPECR	HUMECR	AGER
MASS	1	0.946	0.924	0.735	0.173	-0.008	-0.035	-0.296
POWER	0.946	1	0.948	0.661	0.011	0.058	-0.016	-0.285
IECAP	0.924	0.948	1	0.611	-0.055	0.087	0.001	-0.406
KMAGE	0.735	0.661	0.611	1	0.061	0.054	-0.194	0.148
PRESECR	0.173	0.011	-0.055	0.061	1	-0.474	0.465	-0.161
TEMPECR	-0.008	0.058	0.087	0.054	-0.474	1	-0.4	0.335
HUMECR	-0.035	-0.016	0.001	-0.194	0.465	-0.4	1	-0.266
AGER	-0.296	-0.285	-0.406	0.148	-0.161	0.335	-0.266	1
COMWR	-0.416	-0.316	-0.387	-0.239	-0.14	0.37	-0.115	0.539
CO2MWR	0.891	0.819	0.856	0.583	0.349	-0.095	0.068	-0.399
HCMWR	-0.711	-0.528	-0.535	-0.463	-0.643	0.169	-0.206	0.379
NOXMWR	0.226	0.333	0.404	-0.047	-0.523	-0.029	-0.302	-0.345
FCMWR	0.766	0.742	0.752	0.517	0.285	0.057	0.015	-0.194
CONER	-0.012	0.086	-0.036	0.027	-0.028	0.288	-0.126	0.519
CO2NER	0.834	0.74	0.741	0.673	0.462	-0.253	0.102	-0.403
HCNER	-0.362	-0.132	-0.162	-0.379	-0.671	0.251	-0.244	0.203
NOXNER	0.041	0.099	0.133	-0.244	-0.255	-0.354	-0.12	-0.406
FCNER	0.801	0.757	0.713	0.652	0.41	-0.137	0.045	-0.206
COT21R	-0.294	-0.137	-0.219	-0.389	-0.069	-0.041	-0.088	0.147
GACOT21R	-0.649	-0.433	-0.47	-0.659	-0.335	0.115	-0.193	0.194
G5COT21R	-0.597	-0.397	-0.484	-0.649	-0.379	0.168	-0.34	0.282
G6COT21R	-0.65	-0.468	-0.551	-0.663	-0.335	-0.053	-0.312	0.203
G7COT21R	-0.647	-0.49	-0.565	-0.631	-0.288	-0.189	-0.281	0.138
G8COT21R	-0.644	-0.496	-0.575	-0.604	-0.262	-0.225	-0.262	0.143
G9COT21R	-0.672	-0.529	-0.612	-0.586	-0.258	-0.186	-0.274	0.188
GMCOT21R	-0.761	-0.612	-0.747	-0.584	-0.134	-0.08	-0.211	0.345
LACOT21R	0.5	0.5	0.5	0.139	-0.397	0.982	0.623	-0.79
L5COT21R	0.5	0.5	0.5	0.139	-0.397	0.982	0.623	-0.79
L6COT21R	0.5	0.5	0.5	0.139	-0.397	0.982	0.623	-0.79
L7COT21R	0.5	0.5	0.5	0.139	-0.397	0.982	0.623	-0.79
L8COT21R	0.5	0.5	0.5	0.139	-0.397	0.982	0.623	-0.79
L9COT21R	0.5	0.5	0.5	0.139	-0.397	0.982	0.623	-0.79
LMCOT21R	0.5	0.5	0.5	0.139	-0.397	0.982	0.623	-0.79
DACOT21R	-0.15	-0.786	-0.463	-0.816	0.945	0.5	0.904	0.075
C2T21R	0.759	0.607	0.635	0.552	0.622	-0.055	0.371	-0.32

	MASS	POWER	IECAP	KMAGE	PRESECR	TEMPECR	HUMECR	AGER
GAC2T21R	0.212	0.019	0.06	-0.042	0.535	-0.233	0.269	-0.195
G5C2T21R	0.16	-0.04	0.063	0.084	0.494	-0.422	0.493	-0.234
G6C2T21R	0.104	-0.061	0.03	0.008	0.45	-0.508	0.405	-0.265
G7C2T21R	0.057	-0.095	-0.004	-0.056	0.436	-0.518	0.381	-0.283
G8C2T21R	0.013	-0.11	-0.042	-0.128	0.415	-0.548	0.387	-0.272
G9C2T21R	0.013	-0.114	-0.052	-0.109	0.431	-0.503	0.393	-0.221
GMC2T21R	-0.011	-0.15	-0.116	-0.222	0.597	-0.67	0.533	-0.245
LAC2T21R	-0.513	-0.513	-0.513	-0.797	0.608	0.643	0.987	0.151
L5C2T21R	-0.177	-0.177	-0.177	-0.532	0.289	0.872	0.981	-0.208
L6C2T21R	-0.011	-0.011	-0.011	-0.385	0.126	0.941	0.935	-0.367
L7C2T21R	0.003	0.003	0.003	-0.371	0.112	0.946	0.93	-0.38
L8C2T21R	0.06	0.06	0.06	-0.318	0.055	0.963	0.907	-0.432
L9C2T21R	0.095	0.095	0.095	-0.285	0.02	0.972	0.892	-0.464
LMC2T21R	-0.023	-0.023	-0.023	-0.395	0.137	0.937	0.939	-0.356
DAC2T21R	0.755	0.265	0.566	0.222	0.666	-0.042	0.029	-0.67
HCT21R	-0.613	-0.403	-0.387	-0.627	-0.617	0.13	-0.369	0.165
GAHCT21R	-0.764	-0.646	-0.636	-0.448	-0.428	0.017	-0.154	0.283
G5HCT21R	-0.668	-0.6	-0.665	-0.544	-0.144	-0.303	-0.011	0.191
G6HCT21R	-0.646	-0.584	-0.651	-0.499	-0.131	-0.331	-0.032	0.181
G7HCT21R	-0.647	-0.58	-0.656	-0.496	-0.135	-0.316	-0.011	0.213
G8HCT21R	-0.71	-0.642	-0.718	-0.511	-0.171	-0.212	0.015	0.317
G9HCT21R	-0.756	-0.726	-0.746	-0.376	-0.296	0.104	-0.098	0.479
GMHCT21R	-0.747	-0.679	-0.729	-0.366	-0.338	0.26	-0.22	0.581
LAHCT21R	-0.239	-0.239	-0.239	-0.585	0.349	0.839	0.991	-0.145
L5HCT21R	-0.998	-0.998	-0.998	-0.947	0.998	-0.272	0.418	0.903
L6HCT21R	-1	-1	-1	-0.929	0.994	-0.323	0.37	0.924
L7HCT21R	-1	-1	-1	-0.92	0.991	-0.344	0.349	0.933
L8HCT21R	-0.999	-0.999	-0.999	-0.909	0.987	-0.37	0.322	0.942
L9HCT21R	-1	-1	-1	-0.919	0.991	-0.349	0.344	0.934
LMHCT21R	-1	-1	-1	-0.918	0.99	-0.351	0.342	0.935
DAHCT21R	-0.955	-0.494	-0.807	-0.449	-0.466	0.781	0.286	0.975
NOT21R	-0.046	0.024	0.075	-0.167	-0.528	0.107	-0.491	0.055
LANOT21R	-0.987	-0.987	-0.987	-0.855	0.962	-0.476	0.21	0.975
L5NOT21R	-0.974	-0.974	-0.974	-0.819	0.942	-0.532	0.146	0.987
L6NOT21R	-0.991	-0.991	-0.991	-0.868	0.969	-0.452	0.237	0.968
L7NOT21R	-0.988	-0.988	-0.988	-0.858	0.964	-0.47	0.217	0.973
L8NOT21R	-0.994	-0.994	-0.994	-0.879	0.974	-0.432	0.258	0.963
L9NOT21R	-0.993	-0.993	-0.993	-0.875	0.972	-0.439	0.25	0.965
LMNOT21R	-0.982	-0.982	-0.982	-0.84	0.954	-0.5	0.183	0.981
DANOT21R	-0.84	-0.984	-0.971	-0.974	0.381	0.98	0.919	0.796
FCT21R	0.648	0.559	0.56	0.396	0.59	-0.065	0.338	-0.273
COMS1R	-0.425	-0.296	-0.336	-0.422	-0.21	-0.037	-0.139	0.265
GACOMS1R	-0.712	-0.565	-0.594	-0.639	-0.174	-0.121	0.057	0.206
G5COMS1R	-0.644	-0.514	-0.603	-0.65	-0.185	-0.028	-0.162	0.276
G6COMS1R	-0.67	-0.547	-0.617	-0.641	-0.225	-0.082	-0.168	0.254

	MASS	POWER	IECAP	KMAGE	PRESECR	TEMPECR	HUMECR	AGER
G7COMS1R	-0.69	-0.578	-0.638	-0.63	-0.225	-0.113	-0.174	0.23
G8COMS1R	-0.71	-0.619	-0.666	-0.619	-0.204	-0.164	-0.158	0.189
G9COMS1R	-0.736	-0.66	-0.695	-0.629	-0.202	-0.14	-0.131	0.186
GMCOMS1R	-0.852	-0.82	-0.817	-0.643	-0.21	0.086	-0.063	0.306
LACOMS1R	-0.935	-0.935	-0.935	-1	0.969	0.03	0.673	0.731
L5COMS1R	-0.923	-0.923	-0.923	-1	0.961	0.061	0.695	0.71
L6COMS1R	-0.893	-0.893	-0.893	-0.997	0.939	0.133	0.745	0.657
L7COMS1R	-0.89	-0.89	-0.89	-0.996	0.936	0.14	0.75	0.652
L8COMS1R	-0.881	-0.881	-0.881	-0.994	0.929	0.16	0.763	0.636
L9COMS1R	-0.922	-0.922	-0.922	-1	0.961	0.063	0.697	0.708
LMCOMS1R	-0.986	-0.986	-0.986	-0.977	0.999	-0.166	0.515	0.85
C2MS1R	0.826	0.707	0.753	0.533	0.52	0.068	0.28	-0.424
GAC2MS1R	0.368	0.161	0.268	0.094	0.423	0.038	0.107	-0.28
G5C2MS1R	0.424	0.212	0.353	0.304	0.462	-0.156	0.444	-0.266
G6C2MS1R	0.325	0.125	0.266	0.218	0.433	-0.327	0.381	-0.335
G7C2MS1R	0.239	0.066	0.2	0.145	0.362	-0.402	0.302	-0.365
G8C2MS1R	0.179	0.022	0.157	0.077	0.324	-0.407	0.251	-0.38
G9C2MS1R	0.099	-0.045	0.071	-0.024	0.349	-0.496	0.318	-0.405
GMC2MS1R	0.053	-0.095	0.027	-0.078	0.372	-0.536	0.317	-0.451
LAC2MS1R	-0.135	-0.135	-0.135	-0.497	0.248	0.892	0.972	-0.248
L5C2MS1R	0.004	0.004	0.004	-0.371	0.111	0.946	0.929	-0.381
L6C2MS1R	0.061	0.061	0.061	-0.317	0.054	0.963	0.907	-0.433
L7C2MS1R	0.097	0.097	0.097	-0.282	0.017	0.972	0.891	-0.466
L8C2MS1R	0.121	0.121	0.121	-0.26	-0.006	0.977	0.88	-0.486
L9C2MS1R	0.077	0.077	0.077	-0.302	0.038	0.967	0.9	-0.448
LMC2MS1R	0.125	0.125	0.125	-0.255	-0.011	0.978	0.878	-0.49
DAC2MS1R	0.796	0.322	0.616	0.265	0.633	0.006	0.038	-0.716
HCMS1R	-0.604	-0.427	-0.383	-0.522	-0.746	0.167	-0.487	0.247
GAHCMS1R	-0.667	-0.554	-0.563	-0.36	-0.426	-0.04	-0.154	0.254
G5HCMS1R	-0.633	-0.584	-0.653	-0.494	-0.113	-0.289	0.025	0.233
G6HCMS1R	-0.655	-0.615	-0.677	-0.49	-0.116	-0.25	0.035	0.272
G7HCMS1R	-0.667	-0.629	-0.681	-0.488	-0.148	-0.192	0.056	0.334
G8HCMS1R	-0.634	-0.6	-0.645	-0.412	-0.196	-0.133	0.003	0.373
G9HCMS1R	-0.612	-0.563	-0.615	-0.324	-0.288	0.025	-0.103	0.477
GMHCMS1R	-0.614	-0.55	-0.615	-0.372	-0.27	-0.027	-0.13	0.412
LAHCMS1R	-1	-1	-1	-0.917	0.99	-0.353	0.34	0.936
L5HCMS1R	-1	-1	-1	-0.921	0.991	-0.343	0.35	0.932
L6HCMS1R	-1	-1	-1	-0.916	0.99	-0.355	0.338	0.937
L7HCMS1R	-1	-1	-1	-0.916	0.99	-0.355	0.338	0.937
L8HCMS1R	-0.999	-0.999	-0.999	-0.91	0.988	-0.368	0.325	0.941
L9HCMS1R	-0.999	-0.999	-0.999	-0.911	0.988	-0.367	0.326	0.941
LMHCMS1R	-1	-1	-1	-0.924	0.992	-0.336	0.357	0.929
DAHCMS1R	-0.991	-0.634	-0.895	-0.594	-0.309	0.876	0.445	0.998
NOMS1R	0.075	0.172	0.222	-0.065	-0.63	0.246	-0.645	-0.014
LANOMS1R	-0.943	-0.943	-0.943	-0.749	0.898	-0.624	0.034	0.999

	MASS	POWER	IECAP	KMAGE	PRESECR	TEMPECR	HUMECR	AGER
L5NOMS1R	-0.946	-0.946	-0.946	-0.756	0.902	-0.616	0.044	0.998
L6NOMS1R	-0.95	-0.95	-0.95	-0.763	0.907	-0.607	0.055	0.998
L7NOMS1R	-0.951	-0.951	-0.951	-0.767	0.91	-0.603	0.061	0.997
L8NOMS1R	-0.941	-0.941	-0.941	-0.747	0.896	-0.627	0.03	0.999
L9NOMS1R	-0.899	-0.899	-0.899	-0.67	0.843	-0.708	-0.079	0.998
LMNOMS1R	-0.935	-0.935	-0.935	-0.735	0.889	-0.64	0.013	1
DANOMS1R	-0.998	-0.766	-0.962	-0.732	-0.127	0.95	0.603	0.991
FCMS1R	0.7	0.64	0.68	0.369	0.429	0.079	0.213	-0.347

Table12: Correlation for conventional gasoline vehicles

Annex 11: Correlation for diesel vehicles

	MASS	POWER	IECAP	KMAGE	PRESECR	TEMPECR	HUMECR	AGER
MASS	1	0.858	0.81	-0.007	0.318	0.296	-0.252	0.033
POWER	0.858	1	0.836	-0.067	0.274	0.192	-0.361	0.039
IECAP	0.81	0.836	1	0.156	0.381	0.358	-0.403	0.254
KMAGE	-0.007	-0.067	0.156	1	0.269	0.209	-0.655	0.914
PRESECR	0.318	0.274	0.381	0.269	1	0.588	-0.518	0.176
TEMPECR	0.296	0.192	0.358	0.209	0.588	1	-0.406	0.05
HUMECR	-0.252	-0.361	-0.403	-0.655	-0.518	-0.406	1	-0.602
AGER	0.033	0.039	0.254	0.914	0.176	0.05	-0.602	1
COMWR	-0.51	-0.479	-0.292	0.297	-0.245	-0.337	0.108	0.242
CO2MWR	0.86	0.746	0.847	0.192	0.553	0.57	-0.355	0.18
HCMWR	-0.418	-0.338	-0.15	0.471	-0.09	-0.201	-0.207	0.399
NOXMWR	0.62	0.457	0.655	0.184	0.52	0.396	-0.102	0.167
FCMWR	0.861	0.746	0.846	0.186	0.543	0.563	-0.342	0.174
PMMWR	0.034	-0.072	0.207	0.414	-0.113	0.037	0.034	0.55
CONER	-0.386	-0.291	-0.143	-0.038	-0.298	-0.302	0.227	-0.128
CO2NER	0.87	0.784	0.838	0.172	0.507	0.525	-0.322	0.178
HCNER	-0.269	-0.137	0.027	0.209	-0.191	-0.175	-0.147	0.158
NOXNER	0.486	0.336	0.464	0.207	0.465	0.336	0.007	0.186
FCNER	0.871	0.784	0.837	0.161	0.492	0.514	-0.305	0.166
PMNER	0.336	0.368	0.63	0.242	0.087	0.197	-0.205	0.478
COT21R	-0.379	-0.3	-0.171	0.172	-0.303	-0.307	0.177	0.135
LACOT21R	-0.44	-0.549	-0.537	0.888	-0.526	-0.107	-0.691	0.669
L5COT21R	-0.12	-0.29	-0.213	0.84	-0.855	-0.708	-0.678	0.982
L6COT21R	-0.261	-0.367	-0.32	0.874	-0.818	-0.512	-0.79	0.91
L7COT21R	-0.487	-0.604	-0.586	0.889	-0.539	-0.165	-0.697	0.689
L8COT21R	-0.657	-0.682	-0.733	0.505	0.114	0.52	-0.326	0.011
L9COT21R	-0.427	-0.434	-0.511	0.057	0.637	0.904	0.193	-0.52
LMCOT21R	-0.31	-0.236	-0.33	-0.21	0.752	0.975	0.315	-0.722
C2T21R	0.825	0.731	0.815	0.237	0.543	0.394	-0.543	0.239
GAC2T21R	0.645	0.731	0.163	-0.222	-0.269	0.062	-0.426	-0.242
G5C2T21R	0.559	0.685	0.035	-0.132	-0.528	0.004	-0.481	-0.171
G6C2T21R	0.512	0.632	0.023	-0.036	-0.619	-0.045	-0.518	-0.11
G7C2T21R	0.49	0.59	-0.021	0.019	-0.659	-0.095	-0.522	-0.06
G8C2T21R	0.547	0.67	0.178	0.066	-0.668	-0.029	-0.588	-0.021
G9C2T21R	0.48	0.5	0.177	0.088	-0.62	-0.046	-0.593	0.004
GMC2T21R	0.56	0.437	0.283	-0.229	-0.159	0.193	-0.38	-0.231

	MASS	POWER	IECAP	KMAGE	PRESECR	TEMPECR	HUMECR	AGER
LAC2T21R	0.898	0.771	0.809	-0.424	0.298	-0.012	0.719	-0.245
L5C2T21R	0.821	0.742	0.774	-0.552	0.34	-0.032	0.733	-0.333
L6C2T21R	0.793	0.566	0.619	-0.35	0.433	0.025	0.849	-0.271
L7C2T21R	0.774	0.628	0.658	-0.503	0.519	0.143	0.867	-0.427
L8C2T21R	0.821	0.601	0.634	-0.313	0.519	0.239	0.866	-0.346
L9C2T21R	0.682	0.317	0.384	-0.068	0.483	0.106	0.872	-0.165
LMC2T21R	0.624	0.162	0.263	0.332	0.14	-0.167	0.6	0.26
HCT21R	-0.322	-0.269	-0.087	0.504	-0.022	-0.154	-0.203	0.425
GAHCT21R	-0.477	-0.398	-0.424	0.449	-0.285	-0.205	-0.173	0.293
G5HCT21R	-0.405	-0.39	-0.48	0.33	-0.406	-0.17	-0.077	0.183
G6HCT21R	-0.432	-0.411	-0.468	0.371	-0.426	-0.199	-0.078	0.213
G7HCT21R	-0.447	-0.408	-0.435	0.404	-0.454	-0.218	-0.107	0.226
G8HCT21R	-0.467	-0.42	-0.418	0.437	-0.469	-0.242	-0.11	0.249
G9HCT21R	-0.481	-0.392	-0.294	0.503	-0.514	-0.278	-0.171	0.272
GMHCT21R	-0.503	-0.425	-0.218	0.465	-0.415	-0.32	-0.194	0.21
LAHCT21R	-0.532	-0.772	-0.693	0.581	-0.343	-0.568	-0.28	0.578
L5HCT21R	-0.389	-0.65	-0.556	0.573	-0.412	-0.68	-0.253	0.648
L6HCT21R	-0.347	-0.612	-0.515	0.571	-0.433	-0.709	-0.249	0.667
L7HCT21R	-0.356	-0.619	-0.523	0.572	-0.432	-0.705	-0.253	0.666
L8HCT21R	-0.44	-0.706	-0.617	0.595	-0.375	-0.623	-0.252	0.624
L9HCT21R	-0.6	-0.884	-0.82	0.505	-0.018	-0.281	-0.041	0.326
LMHCT21R	-0.702	-0.661	-0.737	0.022	0.574	0.755	0.068	-0.498
NOT21R	0.496	0.342	0.596	0.245	0.438	0.364	-0.092	0.23
LANOT21R	0.158	-0.046	-0.007	0.893	-0.575	-0.157	-0.477	0.765
L5NOT21R	-0.046	-0.226	-0.195	0.928	-0.574	-0.134	-0.568	0.756
L6NOT21R	0.095	-0.084	-0.048	0.897	-0.615	-0.179	-0.544	0.781
L7NOT21R	0.188	0.057	0.083	0.816	-0.618	-0.14	-0.544	0.733
L8NOT21R	0.07	-0.094	-0.062	0.892	-0.622	-0.173	-0.568	0.776
L9NOT21R	0.428	-0.017	0.068	0.785	-0.177	-0.116	0.135	0.585
LMNOT21R	0.313	-0.137	-0.03	0.826	-0.346	-0.393	0.018	0.745
FCT21R	0.825	0.731	0.813	0.231	0.533	0.391	-0.535	0.233
GAPMT21R	-0.358	-0.48	-0.574	0.585	-0.405	-0.415	0.061	0.616
G5PMT21R	-0.393	-0.556	-0.502	0.462	-0.401	-0.417	-0.023	0.419
G6PMT21R	-0.45	-0.56	-0.487	0.653	-0.502	-0.409	-0.069	0.638
G7PMT21R	-0.478	-0.604	-0.576	0.636	-0.409	-0.392	0.067	0.668
G8PMT21R	-0.422	-0.557	-0.589	0.604	-0.362	-0.39	0.103	0.655
G9PMT21R	-0.207	-0.371	-0.514	0.491	-0.404	-0.262	0.087	0.529
GMPMT21R	0.069	0.226	0.128	0.425	0.11	-0.326	0.282	0.501
LAPMT21R	-0.088	0.081	0.119	-0.333	-0.445	-0.792	-0.259	0.212
L5PMT21R	0.038	0.271	0.293	-0.464	-0.418	-0.72	-0.23	0.117
L6PMT21R	0.134	0.269	0.317	-0.36	-0.439	-0.807	-0.153	0.222
L7PMT21R	0.216	0.303	0.361	-0.322	-0.432	-0.826	-0.091	0.255
L8PMT21R	0.071	0.024	0.109	-0.07	-0.453	-0.902	-0.099	0.416
L9PMT21R	-0.489	-0.577	-0.508	0.214	-0.375	-0.731	-0.277	0.439
LMPMT21R	-0.819	-0.939	-0.93	0.66	-0.177	-0.034	-0.458	0.362

	MASS	POWER	IECAP	KMAGE	PRESECR	TEMPECR	HUMECR	AGER
COMS1R	-0.529	-0.491	-0.379	0.14	-0.429	-0.293	0.327	0.088
LACOMS1R	-0.567	-0.535	-0.564	0.698	-0.419	0.092	-0.741	0.447
L5COMS1R	-0.467	-0.485	-0.486	0.806	-0.609	-0.145	-0.808	0.66
L6COMS1R	-0.496	-0.504	-0.52	0.77	-0.484	0.018	-0.747	0.542
L7COMS1R	-0.51	-0.507	-0.537	0.714	-0.354	0.174	-0.672	0.413
L8COMS1R	-0.573	-0.519	-0.573	0.559	-0.158	0.378	-0.571	0.187
L9COMS1R	-0.627	-0.538	-0.605	0.448	-0.046	0.47	-0.511	0.051
LMCOMS1R	-0.667	-0.477	-0.579	-0.017	0.368	0.741	-0.194	-0.443
C2MS1R	0.87	0.766	0.765	0.159	0.479	0.377	-0.491	0.162
GAC2MS1R	0.486	0.533	-0.071	-0.089	-0.299	-0.097	-0.302	-0.104
G5C2MS1R	0.394	0.466	-0.208	-0.031	-0.566	-0.062	-0.286	-0.053
G6C2MS1R	0.505	0.575	-0.056	-0.013	-0.607	-0.074	-0.438	-0.053
G7C2MS1R	0.508	0.568	-0.055	-0.004	-0.643	-0.073	-0.504	-0.054
G8C2MS1R	0.498	0.559	-0.038	0.004	-0.645	-0.064	-0.537	-0.066
G9C2MS1R	0.396	0.367	-0.141	0.033	-0.571	-0.061	-0.476	0.008
GMC2MS1R	-0.108	-0.265	-0.088	-0.095	0.15	0.142	-0.037	-0.072
LAC2MS1R	0.908	0.925	0.945	-0.51	0.1	-0.099	0.489	-0.199
L5C2MS1R	0.568	0.82	0.792	-0.847	0.163	-0.032	0.339	-0.468
L6C2MS1R	0.675	0.63	0.658	-0.664	0.412	-0.045	0.758	-0.431
L7C2MS1R	0.887	0.815	0.852	-0.481	0.203	-0.115	0.633	-0.213
L8C2MS1R	0.951	0.841	0.878	-0.363	0.188	-0.045	0.622	-0.158
L9C2MS1R	0.99	0.887	0.924	-0.254	0.061	-0.071	0.498	-0.042
LMC2MS1R	0.725	0.542	0.605	0.513	-0.576	-0.375	-0.182	0.678
HCMS1R	-0.478	-0.427	-0.224	0.524	-0.101	-0.254	-0.151	0.442
GAHCMS1R	-0.422	-0.326	-0.32	0.499	-0.299	-0.477	-0.065	0.361
G5HCMS1R	-0.285	-0.223	-0.419	0.524	-0.666	-0.465	-0.075	0.367
G6HCMS1R	-0.3	-0.229	-0.4	0.539	-0.675	-0.465	-0.094	0.37
G7HCMS1R	-0.317	-0.234	-0.377	0.555	-0.683	-0.462	-0.116	0.372
G8HCMS1R	-0.368	-0.244	-0.259	0.594	-0.683	-0.427	-0.2	0.362
G9HCMS1R	-0.385	-0.256	-0.122	0.547	-0.568	-0.461	-0.263	0.278
GMHCMS1R	-0.523	-0.334	-0.146	0.523	-0.49	-0.335	-0.267	0.254
LAHCMS1R	-0.748	-0.864	-0.823	0.628	-0.416	-0.42	-0.544	0.558
L5HCMS1R	-0.532	-0.734	-0.661	0.712	-0.527	-0.6	-0.491	0.724
L6HCMS1R	-0.569	-0.763	-0.696	0.73	-0.514	-0.552	-0.513	0.711
L7HCMS1R	-0.663	-0.82	-0.765	0.684	-0.467	-0.489	-0.53	0.639
L8HCMS1R	-0.732	-0.877	-0.833	0.653	-0.384	-0.399	-0.502	0.556
L9HCMS1R	-0.908	-0.95	-0.945	0.495	-0.199	-0.139	-0.495	0.302
LMHCMS1R	-0.955	-0.941	-0.946	0.308	-0.103	-0.121	-0.426	0.154
NOMS1R	0.613	0.472	0.613	0.123	0.382	0.436	-0.125	0.082
LANOMS1R	0.249	0.116	0.149	0.799	-0.664	-0.214	-0.542	0.769
L5NOMS1R	0.057	-0.113	-0.087	0.886	-0.544	-0.075	-0.524	0.713
L6NOMS1R	0.064	-0.102	-0.078	0.878	-0.539	-0.064	-0.521	0.704
L7NOMS1R	0.2	0.12	0.143	0.764	-0.702	-0.217	-0.618	0.758
L8NOMS1R	0.243	0.141	0.175	0.775	-0.735	-0.294	-0.602	0.805
L9NOMS1R	0.567	0.333	0.393	0.702	-0.548	-0.265	-0.239	0.724

	MASS	POWER	IECAP	KMAGE	PRESECR	TEMPECR	HUMECR	AGER
LMNOMS1R	0.716	0.461	0.57	0.237	-0.446	-0.705	0.126	0.587
FCMS1R	0.869	0.764	0.761	0.153	0.466	0.373	-0.48	0.155
GAPMMS1R	-0.303	-0.419	-0.485	0.469	-0.188	-0.421	0.265	0.567
G5PMMS1R	-0.386	-0.332	-0.231	0.573	-0.292	-0.541	-0.035	0.597
G6PMMS1R	-0.335	-0.318	-0.249	0.602	-0.289	-0.551	0.053	0.685
G7PMMS1R	-0.404	-0.371	-0.344	0.653	-0.279	-0.571	0.041	0.761
G8PMMS1R	-0.389	-0.416	-0.501	0.562	-0.2	-0.561	0.203	0.69
G9PMMS1R	-0.283	-0.431	-0.521	0.38	-0.113	-0.361	0.324	0.495
GMPMMS1R	0.187	-0.041	-0.117	-0.091	0.02	0.245	0.295	-0.034
LAPMMS1R	0.064	0.279	0.299	-0.575	-0.251	-0.634	-0.06	-0.027
L5PMMS1R	0.212	0.446	0.458	-0.663	-0.194	-0.551	0.02	-0.109
L6PMMS1R	0.302	0.489	0.516	-0.586	-0.257	-0.622	0.025	-0.011
L7PMMS1R	0.35	0.471	0.51	-0.575	-0.175	-0.612	0.153	-0.031
L8PMMS1R	0.358	0.438	0.476	-0.642	0.01	-0.497	0.332	-0.167
L9PMMS1R	-0.569	-0.864	-0.803	0.398	0.132	-0.194	0.11	0.19
LMPMMS1R	-0.765	-0.962	-0.924	0.439	0.022	-0.166	-0.13	0.22

Table 13 : Correlation for diesel vehicles.

List of illustrations

Literature

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