

WLTP – DHC

Results of Validation Phase 1 tests ***(drivability of the new test cycle)***

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	Car 1	Car 2	Car 3	Car 4
Vehicles category	LCV	PC	PC	PC/LCV
Manufacturer	Ford	VW	Fiat	Mitsubishi
Model name	Transit	Passat	500	L200
Fuel type	Diesel	Diesel	Petrol	Diesel
Engine displacement [cm ³]	2198	1968	875	2477
Max. rated power [kW/min ⁻¹]	103/2625	105/4200	62.5/4125	100/3000
Vehicle test mass [kg]	1855	1930	930	1880
Aftertreatment	DOC	DOC + SCR	TWC	DOC
Emission standard	Euro 4	Euro 6	Euro 5A	Euro 4
Transmission	5MT	AT	5MT	5MT

Vehicles	Gear Shift Strategy	Vehicle Condition	Test Series
Ford Transit Fiat 500 Mitsubishi L200	JP	Cold	1;
		Hot	1, 2, 3;
	EU	Cold	1;
		Hot	1, 2, 3;
VW Passat	AT	Cold - day 1	1;
		Cold - day 2	1;
		Hot - day 1	1, 2;
		Hot - day 2	1, 2;

DAY 1	DAY 2	DAY 3	DAY 4
Vehicle preparation and pre-test of WLTC with the 2 GS strategies. Preconditioning and soak at 22 °C.	NECD cold	WLTC JP cold 1	WLTC HS cold 1
	Precond.	Precond.	Precond.
	WLTC JP hot 1	WLTC JP hot 3	WLTC HS hot 2
	Precond.	Precond.	Precond.
	WLTC JP hot 2	WLTC HS hot 1	WLTC HS hot 3
	Precond.	Precond.	Precond.

Test ID	Laboratory	Vehicle	Gear Shift	Vehicle Conditions	Test series #	Mode Trace Ability										Tire Slip *	Engine Coolant Temperature (C)			Remarks	
						Violation *	Driving Index *										Initial	End of Low phase	End of Middle phase		
							Low ST1	Low ST2	Low ST3	Low ST4	Low ST5	Low Total	Middle	High	Ex-High						
05092011_002	JRC	Ford-LCV*	Japan	Hot	1	Ex-High:1528s	-1.46%	2.94%	-3.26%	-11.12%	-0.15%	0.75%	0.45%	-0.19%	-0.88%	NA	NA	NA	NA	Violations: # 1; Time: 5[s] ; % 0.28	
05092011_003	JRC	Ford-LCV*	Japan	Hot	2	High:1383s; Extra-High: 1528s	-0.98%	1.67%	-6.49%	2.76%	-2.89%	-0.23%	1.39%	0.70%	-0.93%	NA	NA	NA	NA	Violations: # 2; Time: 12[s] ; % 0.67	
06092011_002	JRC	Ford-LCV*	Japan	Cold	1	Ex-High:1528s	-4.04%	2.32%	1.03%	3.07%	-2.65%	0.23%	1.35%	-0.33%	-1.42%	NA	NA	NA	NA	Violations: 1# ; Time:4 [s] ; % 0.22%	
08092011_002	JRC	Ford-LCV*	Japan	Hot	3	Ex-High:1528s; Ex-High:1726s	-1.76%	0.92%	-2.51%	4.17%	-3.26%	-0.39%	0.11%	-0.53%	-0.52%	NA	69	78	83	Violations: 2#; Time:11 [s] ; % 0.61 %	
06092011_005	JRC	Ford-LCV*	Steven	Hot	1	Ex-High:1526s	1.03%	0.02%	3.32%	-0.43%	-4.91%	0.41%	0.14%	-0.21%	-1.31%	NA	NA	NA	NA	Violations: 1#; Time:9 [s] ; % 0.50%	
07092011_001	JRC	Ford-LCV*	Steven	Cold	1	Ex-High:1526s	0.53%	0.91%	0.21%	2.57%	-5.11%	0.42%	0.50%	-1.04%	-1.42%	NA	17	64	84	Violations: 1#; Time:10 [s] ; % 0.56%	
07092011_002	JRC	Ford-LCV*	Steven	Hot	2	Ex-High:1526s	0.37%	0.87%	-0.34%	0.83%	-2.05%	0.43%	1.09%	0.07%	-1.71%	NA	79	86	84	Violations: 1#; Time:10 [s] ; % 0.56 %	
07092011_003	JRC	Ford-LCV*	Steven	Hot	3	Ex-High:1526s	1.62%	2.01%	-1.06%	-7.49%	-3.23%	1.17%	0.03%	0.09%	-1.62%	NA	81	87	85	Violations:1 #; Time: 8[s] ; % 0.44%	
22082011_001	JRC	VW **		Cold	1		1.11%	-0.69%	0.21%	-7.90%	-2.07%	-0.27%	0.47%	-0.38%	-0.33%	NA	23	64	87	Violations: # 0; Time: 0[s] ; % 0.0	
22082011_002	JRC	VW **		Hot	1		1.13%	0.74%	3.28%	6.55%	3.21%	1.31%	0.85%	-1.09%	-0.58%	NA	86	92	91	Violations: # 0; Time: 0[s] ; % 0.0	
22082011_003	JRC	VW **		Hot	2		-0.12%	0.67%	2.99%	9.19%	-0.15%	0.77%	0.64%	-0.02%	-0.13%	NA	98	96	92	Violations: # 0; Time: 0[s] ; % 0.0	
23082011_001	JRC	VW **		Cold	1		-2.24%	1.02%	0.24%	11.73%	-1.71%	0.06%	0.38%	-0.48%	0.10%	NA	23	64	86	Violations: # 0; Time: 0[s] ; % 0.0	
23082011_002	JRC	VW **		Hot	1		0.30%	1.75%	0.37%	7.52%	-4.81%	0.93%	0.00%	-0.42%	-0.68%	NA	76	90	93	Violations: # 0; Time: 0[s] ; % 0.0	
23082011_003	JRC	VW **		Hot	2		1.68%	0.72%	1.75%	6.19%	1.09%	1.15%	1.22%	0.41%	-0.39%	NA	91	92	92	Violations: # 0; Time: 0[s] ; % 0.0	

Test ID	Laboratory	Vehicle	Gear Shift	Vehicle Conditions	Test series #	Mode Trace Ability										Tire Slip *	Engine Coolant Temperature (C)			Remarks
						Violation *	Driving Index *										Initial	End of Low phase	End of Middle phase	
							Low ST1	Low ST2	Low ST3	Low ST4	Low ST5	Low Total	Middle	High	Ex-High					
19092011_004	JRC	Fiat	Japan	Hot	1	Ex-High:1525s	0.27%	-1.09%	-1.38%	-4.17%	-3.44%	-0.59%	-0.28%	-0.58%	-5.12%	NA	83	90	85	Violations: 1# ;Time: 29[s] ;1.61 %
19092011_005	JRC	Fiat	Japan	Hot	2	Ex-High:1525s	0.91%	-1.15%	-1.59%	11.84%	-4.24%	-0.74%	-0.01%	-0.56%	-4.59%	NA	82	90	85	Violations: 1# ;Time: 29[s] ;1.61 %
20092011_001	JRC	Fiat	Japan	Cold	1	Ex-High:1525s	-0.60%	0.22%	0.07%	1.48%	-5.46%	-0.26%	-0.45%	-0.14%	-4.85%	NA	22	79	84	Violations: 1# ;Time: 29[s] ;1.61 %
20092011_002	JRC	Fiat	Japan	Hot	3	Ex-High:1525s	0.42%	-1.70%	-1.29%	-3.25%	-3.65%	-1.25%	-0.29%	-0.27%	-4.78%	NA	87	90	85	Violations: 1# ;Time: 29[s] ;1.61 %
20092011_003	JRC	Fiat	Steven	Hot	1	Ex-High:1496s; Ex-High:1525s	0.13%	-1.44%	0.04%	-4.86%	0.75%	-0.82%	-0.79%	-0.94%	-4.69%	NA	85	89	85	Violations: 2# ;Time: 31[s] ;1.72 %
21092011_001	JRC	Fiat	Steven	Cold	1	Ex-High:1525s	-1.07%	-0.34%	0.99%	-8.19%	-3.83%	-0.61%	0.34%	-0.18%	-4.46%	NA	22	78	85	Violations: 1# ;Time: 29[s] ;1.61 %
21092011_002	JRC	Fiat	Steven	Hot	2	Ex-High:1525s	-1.50%	-2.06%	0.38%	-0.75%	-2.70%	-1.68%	0.10%	-0.63%	-3.85%	NA	87	90	85	Violations: 1# ;Time: 28[s] ;1.56 %
21092011_003	JRC	Fiat	Steven	Hot	3	Ex-High:1525s	-1.30%	-0.92%	-1.13%	-3.62%	-0.14%	-1.02%	0.20%	-0.09%	-4.25%	NA	78	87	85	Violations: 1# ;Time: 28[s] ;1.56 %
05102011_005	JRC	Mitsubishi	Japan	Hot	1	Ex-High:1526s	0.98%	-0.27%	4.00%	1.67%	-1.22%	0.45%	0.70%	0.50%	-1.09%	NA	89	90	91	Violations: 1# ;Time: 12[s] ;0.67 %
05102011_007	JRC	Mitsubishi	Japan	Hot	2	Ex-High:1525s	-1.48%	0.81%	0.56%	12.34%	1.53%	0.37%	0.87%	0.60%	-1.78%	NA	88	90	91	Violations: 1# ;Time: 14[s] ;0.78 %
06102011_003	JRC	Mitsubishi	Japan	Cold	1	Ex-High:1525s	-0.89%	1.67%	0.59%	0.21%	1.85%	0.94%	0.54%	0.02%	-1.87%	NA	24	76	90	Violations: 1# ;Time: 14[s] ;0.78 %
06102011_004	JRC	Mitsubishi	Japan	Hot	3	Ex-High:1525s	-0.22%	-0.01%	2.86%	-6.06%	0.17%	0.20%	0.50%	0.42%	-1.48%	NA	91	90	91	Violations: 1# ;Time: 14[s] ;0.78 %
06102011_005	JRC	Mitsubishi	Steven	Hot	1	High:1170s; Extra-High:1496s;Extra-High:1524s	1.53%	-0.08%	3.56%	4.65%	-1.14%	0.67%	0.05%	-0.65%	-2.87%	NA	88	90	92	Violations: 3# ;Time: 30[s] ;1.67 %
07102011_001	JRC	Mitsubishi	Steven	Cold	1	High:1169s; Extra-High:1496s;Extra-High:1524s	1.25%	0.04%	3.48%	2.43%	2.55%	0.83%	0.04%	-1.05%	-2.23%	NA	25	72	90	Violations:3 # ;Time:33 [s] ;1.83%
07102011_002	JRC	Mitsubishi	Steven	Hot	2	High:1169s; Extra-High:1496s;Extra-High:1524s	0.15%	-0.44%	1.04%	-5.44%	1.38%	-0.10%	0.65%	-0.49%	-2.05%	NA	88	90	92	Violations:3 # ;Time: 33[s] ;1.83%
07102011_003	JRC	Mitsubishi	Steven	Hot	3	Medium:804s;High:1168s; Extra-High:1496s;Extra-High:1525s	0.36%	0.51%	0.76%	-4.13%	2.57%	0.56%	-0.34%	-0.82%	-1.78%	NA	89	90	92	Violations:4 # ;Time:34 [s] ;1.89%

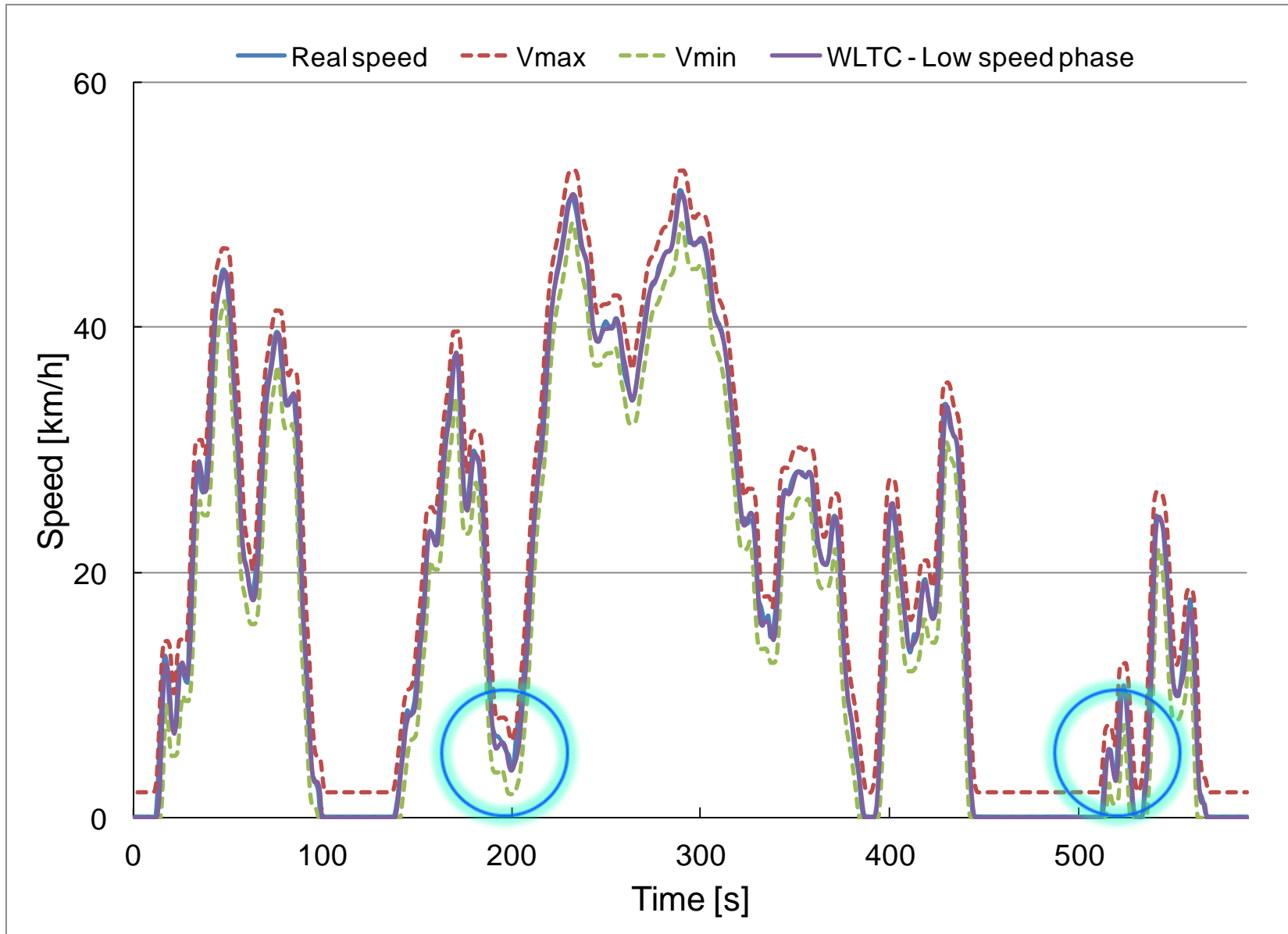
Test ID	Laboratory	Vehicle	Gear Shift	Vehicle Conditions	Test series #	Pollutants (g/km)					
						HC	CO	NOx	CO2	CH4	NO2
05092011_002	JRC	Ford-LCV*	Japan	Hot	1	0.004	0.016	0.704	182.11	-	-
05092011_003	JRC	Ford-LCV*	Japan	Hot	2	0.004	0.014	0.698	183.742		
06092011_002	JRC	Ford-LCV*	Japan	Cold	1	0.009	0.08	0.643	192.04		
08092011_002	JRC	Ford-LCV*	Japan	Hot	3	0.005	0.033	0.68	184.837		
06092011_005	JRC	Ford-LCV*	Steven	Hot	1	0.004	0.013	0.691	180.439		
07092011_001	JRC	Ford-LCV*	Steven	Cold	1	0.008	0.088	0.675	190.722		
07092011_002	JRC	Ford-LCV*	Steven	Hot	2	0.004	0.015	0.694	181.773		
07092011_003	JRC	Ford-LCV*	Steven	Hot	3	0.004	0.014	0.686	180.357		
19082011_003	JRC	VW **		Hot	1	0.007	0.016	0.095	151.073		
22082011_001	JRC	VW **		Cold	1	0.011	0.046	0.163	157.429		
22082011_002	JRC	VW **		Hot	2	0.007	0.014	0.172	148.663		
22082011_003	JRC	VW **		Hot	3	0.007	0.012	0.083	149.706		
23082011_001	JRC	VW **		Cold	1	0.009	0.022	0.103	157.949		
23082011_002	JRC	VW **		Hot	2	0.002	0.01	0.19	139.644		
23082011_003	JRC	VW **		Hot	3	0.007	0.012	0.069	149.149		

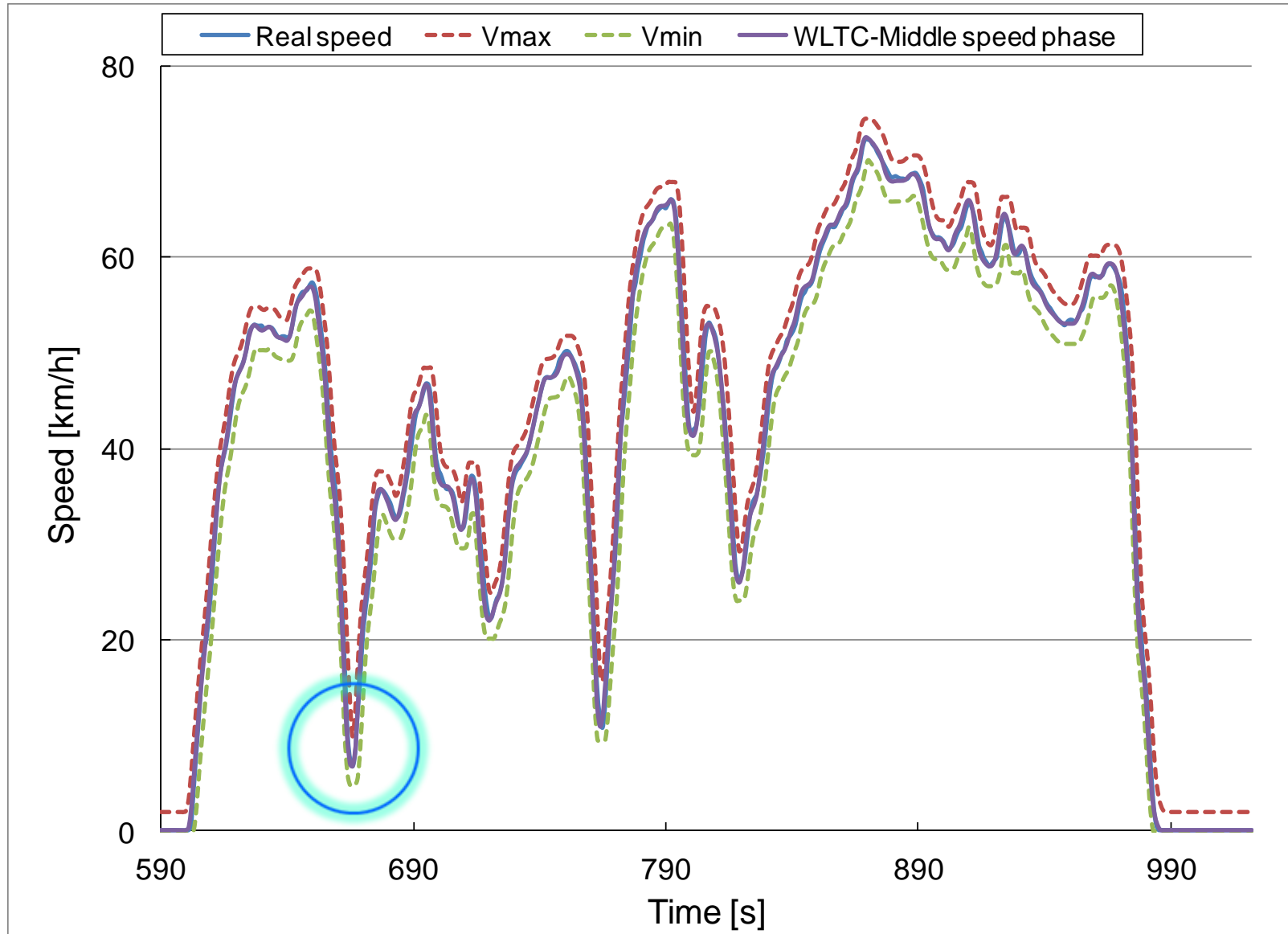
Test ID	Laboratory	Vehicle	Gear Shift	Vehicle Conditions	Test series #	Pollutants (g/km)					
						HC	CO	NOx	CO2	CH4	NO2
19092011_004	JRC	Fiat	Japan	Hot	1	0.025	0.863	0.018	113.16		
19092011_005	JRC	Fiat	Japan	Hot	2	0.021	0.786	0.015	113.359		
20092011_001	JRC	Fiat	Japan	Cold	1	0.056	0.867	0.028	117.567		
20092011_002	JRC	Fiat	Japan	Hot	3	0.025	0.823	0.014	111.978		
20092011_003	JRC	Fiat	Steven	Hot	1	0.022	0.736	0.015	111.977		
21092011_001	JRC	Fiat	Steven	Cold	1	0.053	0.771	0.027	117.075		
21092011_002	JRC	Fiat	Steven	Hot	2	0.02	0.716	0.017	111.477		
21092011_003	JRC	Fiat	Steven	Hot	3	0.023	0.766	0.024	111.493		
05102011_005	JRC	Mitsubishi	Japan	Hot	1	0.011	0.013	0.615	205.24		
05102011_007	JRC	Mitsubishi	Japan	Hot	2	0.011	0.013	0.601	202.856		
06102011_003	JRC	Mitsubishi	Japan	Cold	1	0.023	0.068	0.614	215.639		
06102011_004	JRC	Mitsubishi	Japan	Hot	3	0.011	0.013	0.621	202.636		
06102011_005	JRC	Mitsubishi	Steven	Hot	1	0.07	0.012	0.661	196.547		
07102011_001	JRC	Mitsubishi	Steven	Cold	1	0.012	0.059	0.667	207.508		
07102011_002	JRC	Mitsubishi	Steven	Hot	2	0.007	0.013	0.656	197.358		
07102011_003	JRC	Mitsubishi	Steven	Hot	3	0.007	0.012	0.653	197.001		

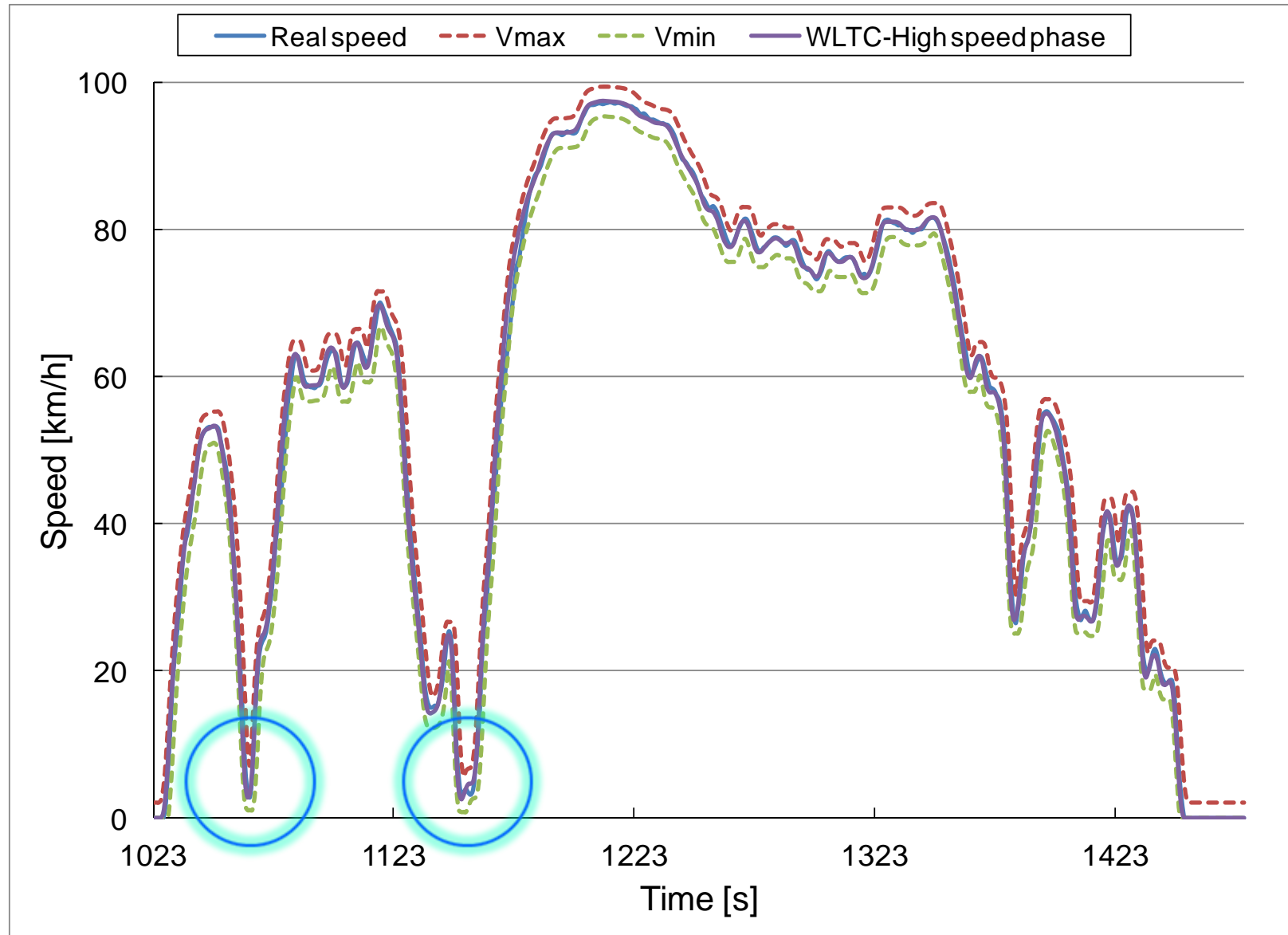
* This car was tested with legislative F0; F1 & F2

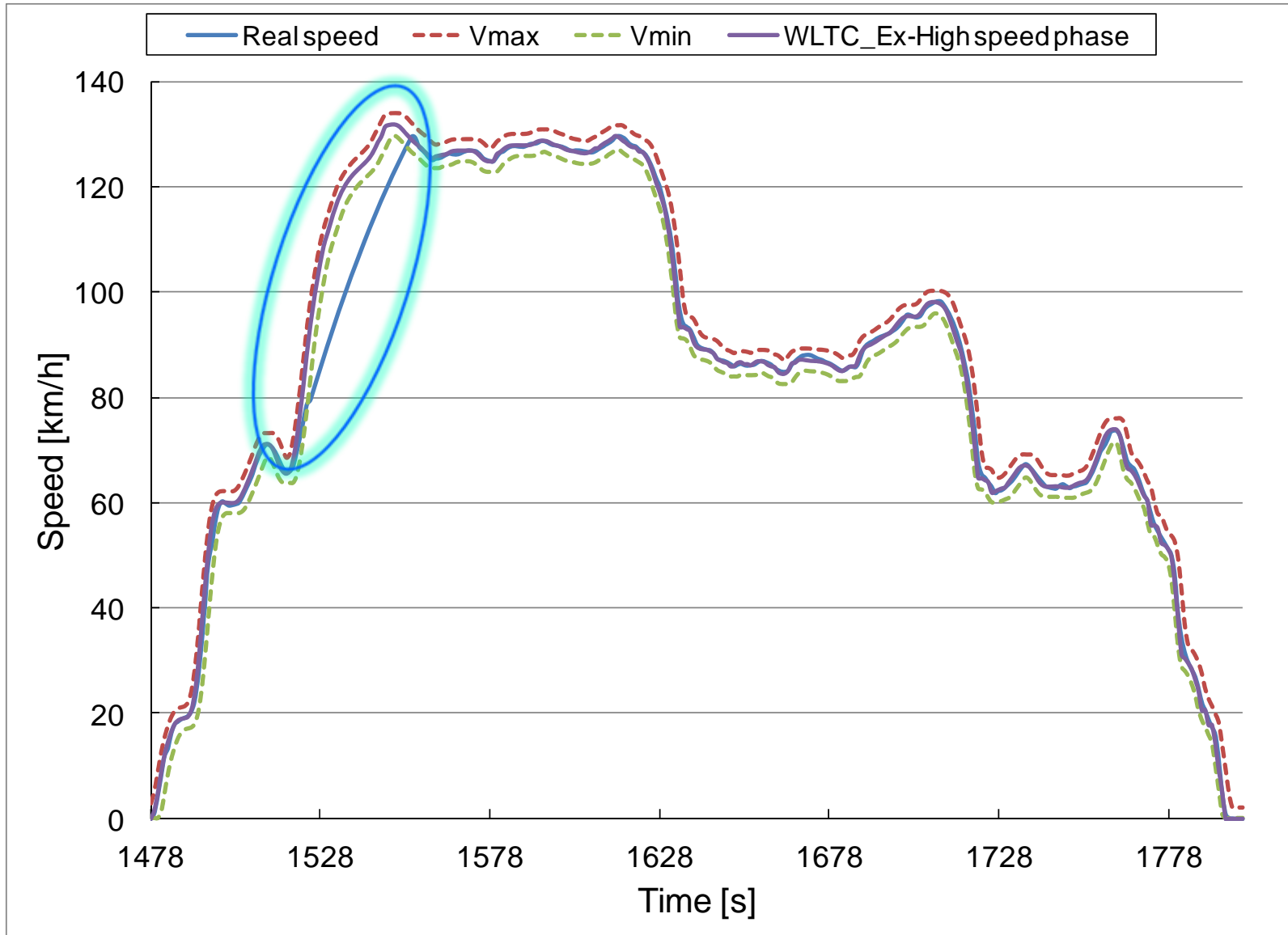
** Automatic Transmission

	A	B	C	D	E	F	G	H	I	J	K
1	Time [s]	Reference speed [km/h]	Real speed [km/h]	Vmax [km/h]	Vmin [km/h]	Exceedence #	Exceedence [s]	Exceedence [km/h]	Num of violations	%	1.61%
2	1	0	0							#	1
3	2	0	0	2	0	0	0	0	0	s	29
4	3	0	0	2	0	0	0	0	0		
5	4	0	0	2	0	0	0	0	0		
6	5	0	0	2	0	0	0	0	0		
7	6	0	0	2	0	0	0	0	0		
8	7	0	0	2	0	0	0	0	0		
9	8	0	0	2	0	0	0	0	0		
10	9	0	0	2	0	0	0	0	0		
11	10	0	0.00277868	2	0	0	0	0	0		
12	11	0	0	2.097508918	0	0	0	0	0		
13	12	0.097508918	0	2.95310716	0	0	0	0	0		
14	13	0.95310716	0.081392784	5.590830183	0	0	0	0	0		
15	14	3.590830183	3.938899827	9.667598915	0	0	0	0	0		
16	15	7.667598915	9.765142059	13.02077665	1.590830183	0	0	0	0		
17	16	11.02077665	11.80995426	14.33351421	5.667598915	0	0	0	0		
18	17	12.33351421	12.37786932	14.33351421	9.020776653	0	0	0	0		
19	18	11.96210928	12.32765207	14.33351421	8.249007702	0	0	0	0		
20	19	10.2490077	9.745628548	13.96210928	6.175428629	0	0	0	0		
21	20	8.175428629	7.850682211	12.2490077	5.074480486	0	0	0	0		
22	21	7.074480486	7.246141911	10.17542863	5.074480486	0	0	0	0		
23	22	7.280308008	6.937367105	10.82345729	5.074480486	0	0	0	0		
24	23	8.823457289	7.906264496	12.99820194	5.280308008	0	0	0	0		
25	24	10.99820194	11.42759676	14.34823895	6.823457289	0	0	0	0		
26	25	12.34823895	13.41372967	14.49322739	8.998201942	0	0	0	0		
27	26	12.49322739	13.00182676	14.49322739	9.973234177	0	0	0	0		
28	27	11.97323418	12.29704828	14.49322739	9.552732468	0	0	0	0		









Laboratory	Vehicle	Gear Shift	Vehicle Conditions	Test series #	Comments			
					Low	Middle	High	Ex-High
JRC	VW Passat PC				With this vehicle (Automatic Transmission) there were no problems to follow the speed profile in all 4 phases			
JRC	Ford Transit LCV				With the Manual Transmission Ford Transit LCV it was a little difficult to follow ST4 and ST5 of the Low Speed Phase, however the driver made no violations. During the extra-High Speed Phase it was impossible to follow the speed profile around second 152			
JRC	Fiat 500 PC				Same as with Ford Transit. The violation at ex-High speed phase was of longer duration.			
JRC	Mitsubishi L200 PC				The Gear Shift strategy obtained from Steven's macro requested the 5th gear at around 40 km/h (maybe a problem with the input data). This happened at sec. 274 of the LSP and at sec. 148 of the MSP. In the pre-test it was impossible to do this up-shift (the engine risked to shut off), so the Gear Shift strategy was not perfectly followed. Again, impossible to follow the ex-High speed profile at 1525 sec.			

General remarks: 1) to improve repeatability it would be better to avoid points with Acceleration=0 and speed < 10 km/h. 2) In the Japanese Gear Shift strategy there are some downshift points from G4 to 0. It would be better to downshift gradually to G3, G2 and then to 0.

