

EUROPEAN LIGHT-DUTY EURO 6 AND HEAVY-DUTY EURO VI EMISSIONS LEGISLATIONS

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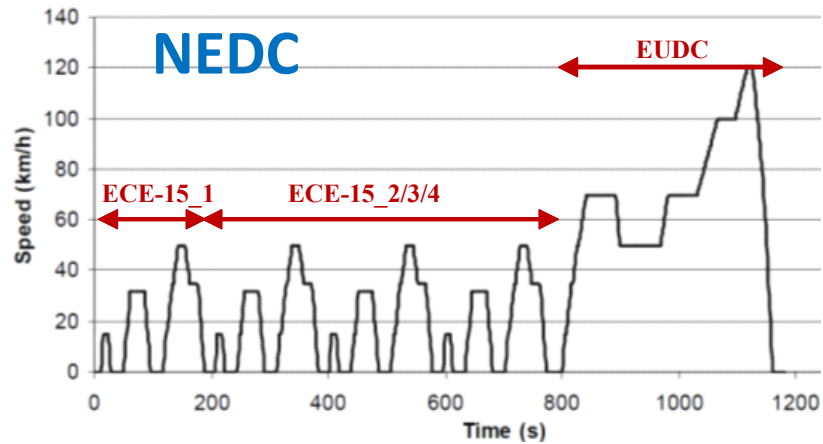
AECC MEMBERS

European Emissions Control companies



Euro 6 legislation (EC) No 715/2007

Euro 6b: for all new vehicles since 1/9/2015



limits	THC mg/km	NMHC mg/km	NOx mg/km	NOx+HC mg/km	CO mg/km	PM mg/km	PN #/km
CI	-	-	80	170	500	4.5	$6 \cdot 10^{11}$
PI	100	68	60	-	1000	4.5 ⁽¹⁾	$6 \cdot 10^{11(1,2)}$

(1) GDI only

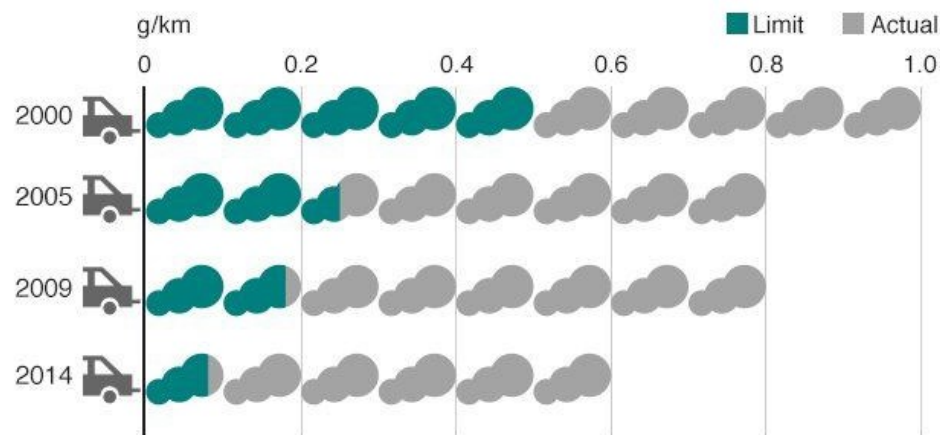
(2) $6 \cdot 10^{12}$ can be requested until 1/9/2017

CI: Compression Ignition

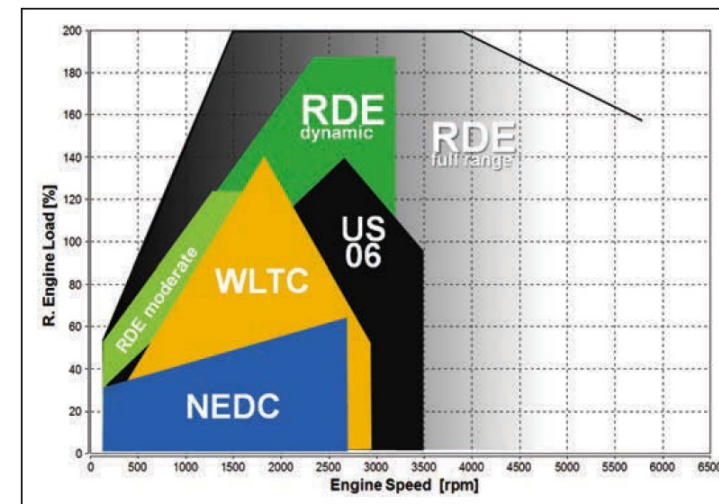
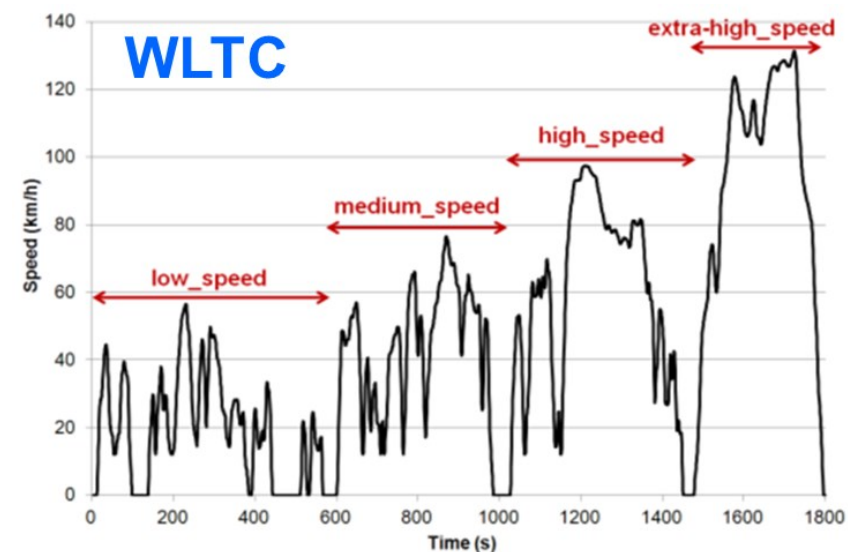
PI: Positive Ignition

GDI: Gasoline Direct Injection

RDE & WLTP legislation to close the gap between lab and real world emissions



Source: the ICCT



Source: AVL

Euro 6 implementation dates

EURO 6C

- final PN limit for GDI and WLTC
- Apply for M1 & N1 Class I from 1 September 2017 (New Types) and 1 September 2018 for all vehicles.
- Apply to N1 Classes II & III and N2 from 1 September 2018 (New Types) and 1 September 2019 (all new vehicles)

EURO 6D-TEMP

- RDE (NOx CF step 1, PN TBC)
- Apply for M1 & N1 Class I from 1 September 2017 (New Types) and 1 September 2019 for all vehicles.
- Apply to N1 Classes II & III and N2 from 1 September 2018 (New Types) and 1 September 2020 (all new vehicles)

EURO 6D

- RDE (NOx CF step 2, PN TBC)
- Apply for M1 & N1 Class I from 1 January 2020 (New Types) and 1 January 2021 for all vehicles.
- Apply to N1 Classes II & III and N2 from 1 January 2021 (New Types) and 1 January 2022 (all new vehicles)

Published Euro 6 RDE packages 1&2

Package number	2015				2016				2017				2018				2019				2020				2021				2022				2023										
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4											
	RDE monitoring phase				NT												All				NT				Euro 6d				All				CF2 = 1.5 (i.e. 1.0 + error measurement of 0.5)										
	CF requirements								NT				Euro 6-dTEMP CF1 = 2.1				All				NT				Euro 6d				All														
1	RDE test procedure																																										
	- Adoption in TCMV																																										
- Publication in OJ																																											
2	NOx CF and dynamic boundary conditions																																										
	- Adoption in TCMV																																										
- Publication in OJ																																											
Annual review of measurement error												EC statement: CF2 = 1.0 as soon as possible, at the latest by 2023																												All			

➤ NTE limit = Euro 6 limit x CF

➤ Conformity Factor (CF) defined for NOx

➤ Error margin to be reviewed annually

➤ CF applies to urban and total RDE

➤ Portable Emissions Measurement Systems (PEMS) used; results post-processed with normalisation tools

NTE: Not To Exceed

CF: Conformity Factor

NT: New Type Approval

All: All new vehicles

TCMV: Technical Committee – Motor Vehicles

OJ: Official Journal

EC: European Commission

European Light-duty Euro 6 and
Heavy-duty Euro VI Emissions Legislations

Expected Euro 6 RDE packages 3&4

Package number	2015				2016				2017				2018				2019				2020				2021				2022				2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4				
	PN CF requirements TBC																																			
3	Definition on PN procedure and CF + cold-start + vans + hybrids																																			
	- Adoption in TCMV																																			
	- Publication in OJ																																			
4	Definition of In-Service Conformity testing																																			
	- Adoption in TCMV																																			
	- Publication in OJ																																			

Agreed
Expected

NT New types

All All new vehicles

➤ RDE package 3

➤ Procedure and CF for Particulate Number (PN)

➤ Cold-start RDE

➤ Light commercial vehicles (LCVs) and hybrids

➤ RDE package 4: Definition of In-Service Conformity testing

NTE: Not To Exceed

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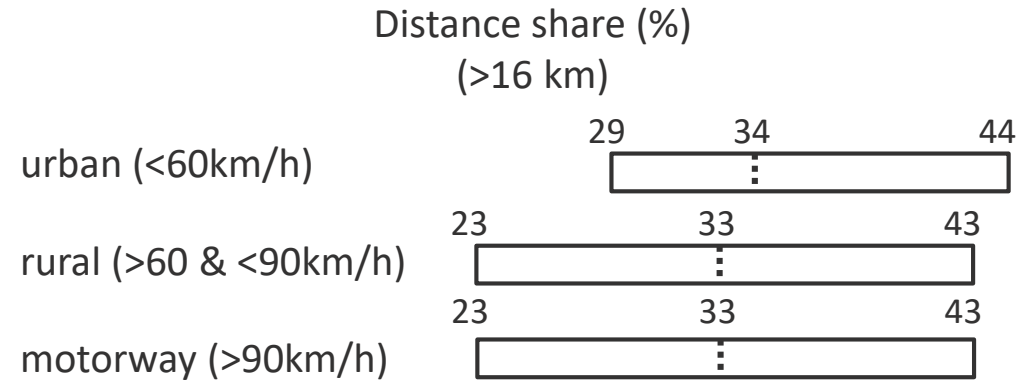
EC: European Commission

LCVs: Light Commercial Vehicles

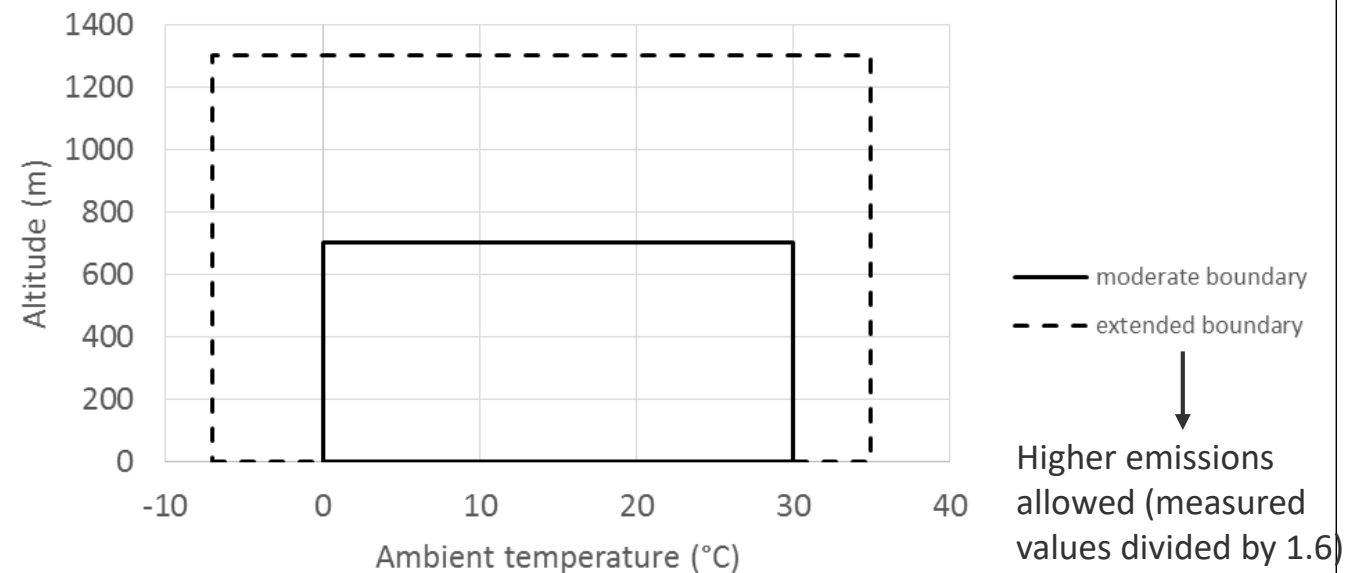
European Light-duty Euro 6 and
Heavy-duty Euro VI Emissions Legislations

Different RDE boundary conditions define normal driving

➤ Route criteria

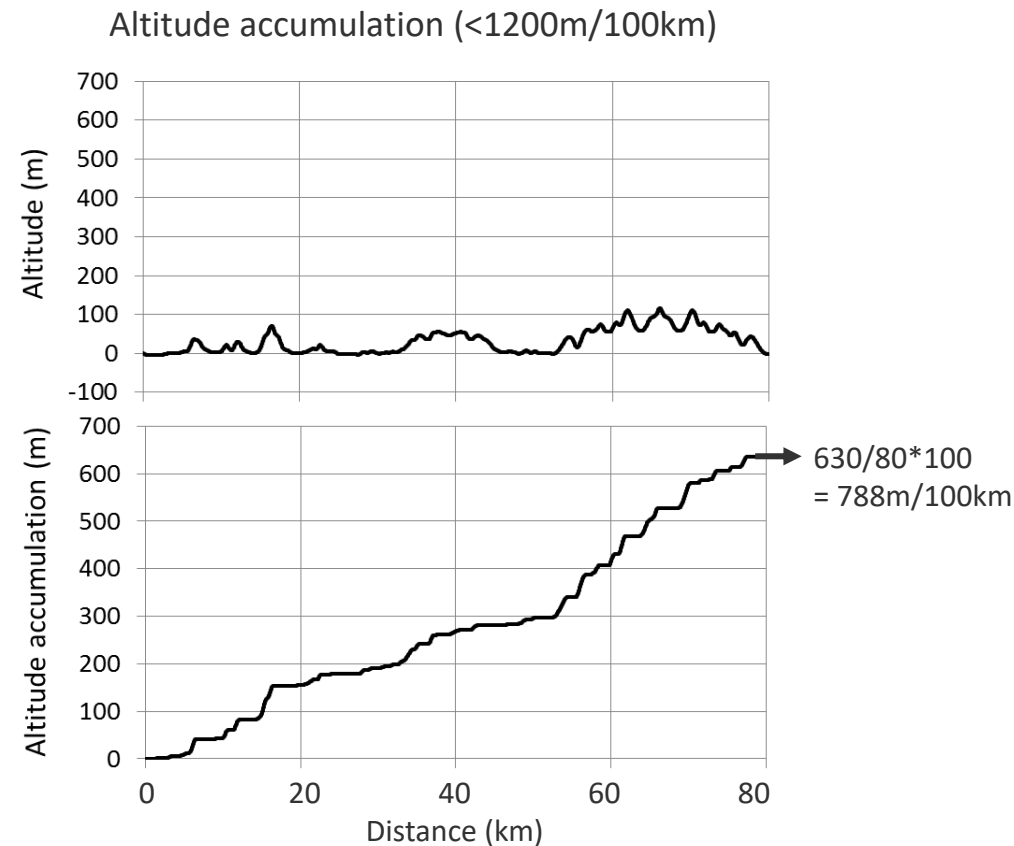


➤ Ambient conditions

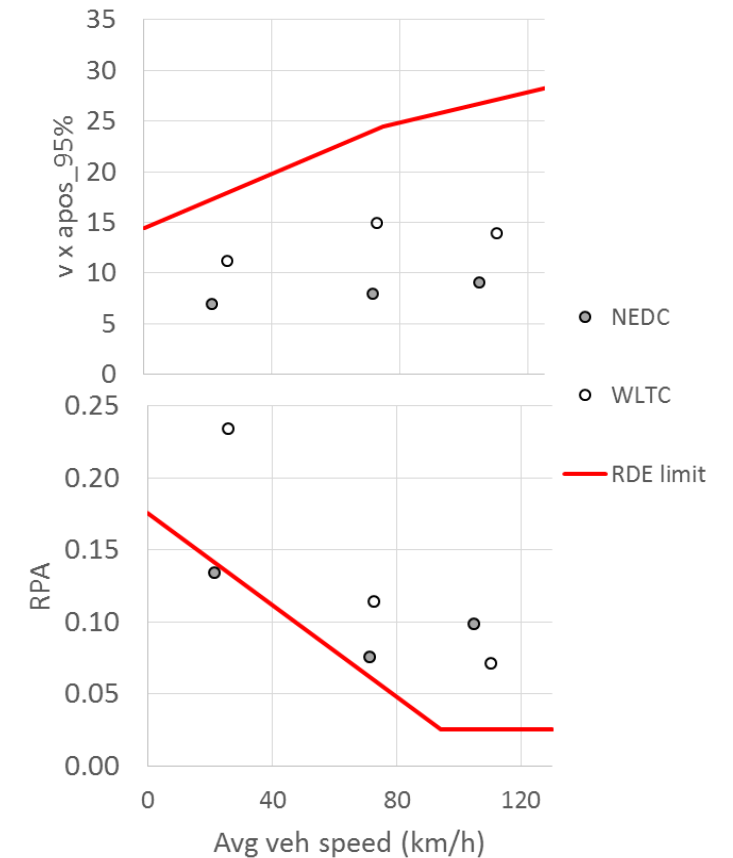


Different RDE boundary conditions define normal driving

➤ Dynamic conditions



excess or absence of driving dynamics



Heavy-duty Euro VI (EC) 595/2009

➤ Emission limits

	Limit values							
	CO (mg/kWh)	THC (mg/kWh)	NMHC (mg/kWh)	CH ₄ (mg/kWh)	NO _x ⁽¹⁾ (mg/kWh)	NH ₃ (ppm)	PM mass (mg/kWh)	PM number (#/kWh)
WHSC (CI)	1 500	130			400	10	10	$8,0 \times 10^{11}$
WHTC (CI)	4 000	160			460	10	10	$6,0 \times 10^{11}$
WHTC (PI)	4 000		160	500	460	10	10	⁽²⁾ $6,0 \times 10^{11}$

- HD Type Approval uses worldwide harmonised cycles
- Off-cycle emission testing is included (CI only)
- Gaseous PEMS testing (CF=1.5)
 - demonstration test at type approval
 - In-Service Conformity testing
- PEMS currently not for PM&PN but PEMS-PN pilot programme has started
- Procedure for accelerated ageing to be used for approval of replacement pollution control devices

THANK YOU!

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