

Introductory Remarks:



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MARYANNE KAMAU advises governments, private entities and trade associations on international trade matters, with a particular focus on the World Trade Organization (WTO) and European trade law and policy. In addition, Maryanne focuses on trade issues relating to the digital economy. Most recently, Maryanne has been advising clients on various aspects of the legal and policy implications of Brexit and on the European Green Deal.

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Sidley Office Locations



Speakers:



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BARTOSZ MROZEK is a Type Approval Engineer within TÜV Rheinland AG working in the field of cars, trucks and buses. Together with his colleagues, he helps his clients to better understand the requirements and procedures to obtain type approvals for the European market. He is focused on whole vehicle type approvals, emissions-related requirements for on-road light and heavy-duty vehicles and vehicle dynamics.



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DAVE GARRETT is an independent consultant and has been helping clients to better understand and successfully manage vehicle and mobile source emission and fuel economy regulations, certification, and compliance issues since 2016. His consulting business is built on his 32-year career at General Motors which included a series of technical and leadership positions, all of which were related to emission regulations and engine-emission control systems. A capstone of Dave's career at GM was to establish and lead a comprehensive, global governance program to guide compliance with all applicable emissions, diagnostics, and fuel economy regulations in all markets around the world.

Emissions Compliance in the EU: Understanding the Fundamentals

Information Event on European Type Approval Systematic,
Emissions and Fuel Consumption of Light- and Heavy-Duty
Vehicle within the EU
(high-level overview)

Bartosz Mrozek, Type Approval Engineer / Auditor ISO 9001

2021-02-04

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Emissions Compliance in the EU: Understanding the Fundamentals

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I. European Type Approval Systematic

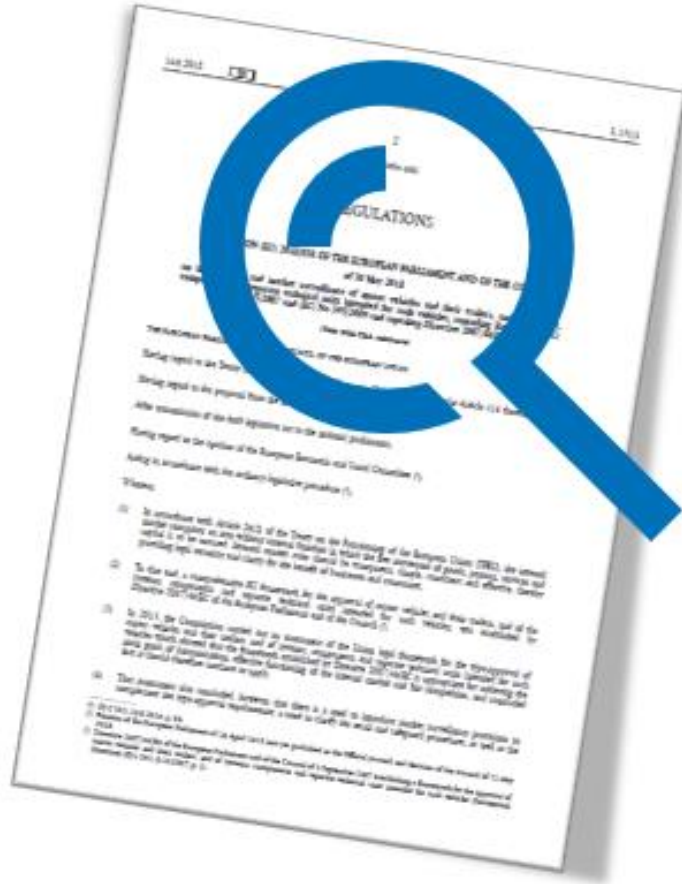
II. Emissions of Light Passenger and Commercial Vehicles

III. Emissions of Heavy Duty Vehicles

IV. CO₂ Emissions and Fuel Consumption of Heavy Duty Vehicles

I. European Type Approval Systematic

Guiding Questions



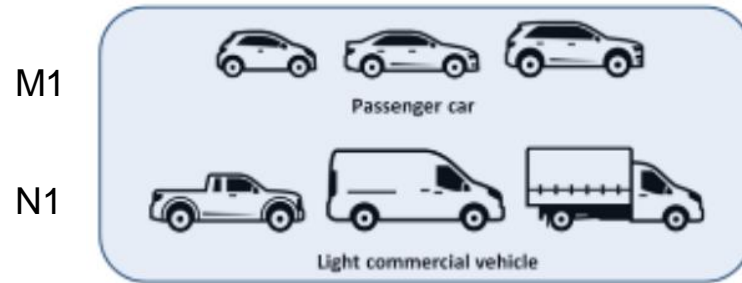
- a. How to get an approval according to the new framework regulation?
- b. What is the information folder?
- c. Who are the actors and participants involved in the process of getting an approval?
- d. What kinds of approval do exist?
- e. Which kind of legal requirement are part of the framework regulation?
- f. What are Conformity of Production arrangements?
- g. What are the obligations for approved vehicles which are not in conformity or that present a serious risk?
- h. What is Market surveillance in the EU?
- i. What is the compliance verification by the EU-Commission?
- j. Are there penalties in the EU?

I. European Type Approval Systematic

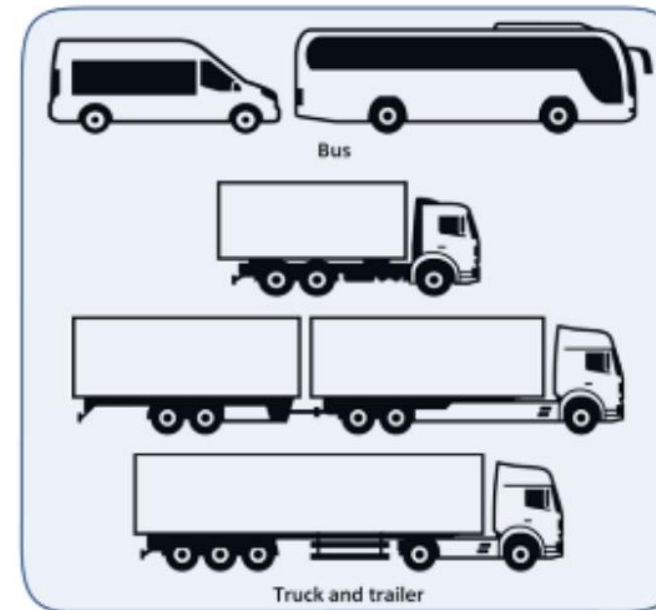
General Information on the Framework Regulation

What are we able to get approved within the requirements of the Regulation (EU) 2018/858?

- Motor vehicles (category M1, M2, M3, N1, N2, N3)
- Trailers (O1, O2, O3, O4)
- Systems, components and separate technical units intended for such vehicles



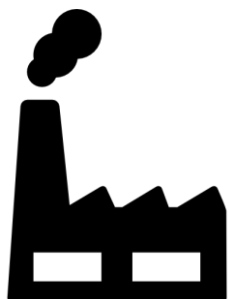
Light Duty Vehicles



Heavy Duty Vehicles

I. European Type Approval Systematic

General Information on the Framework Regulation - What is the Regulation (EU) 2018/858 about?



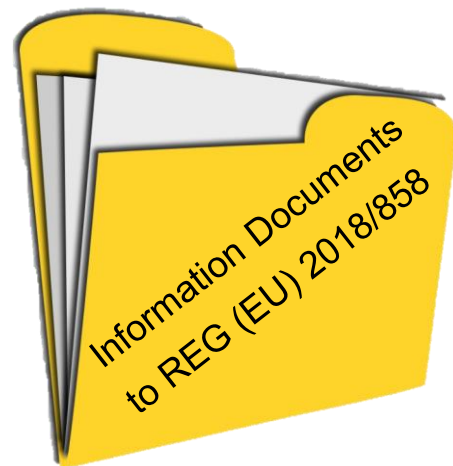
Manufacturer



Technical Service



Type Approval Authority / Market Surveillance Authority

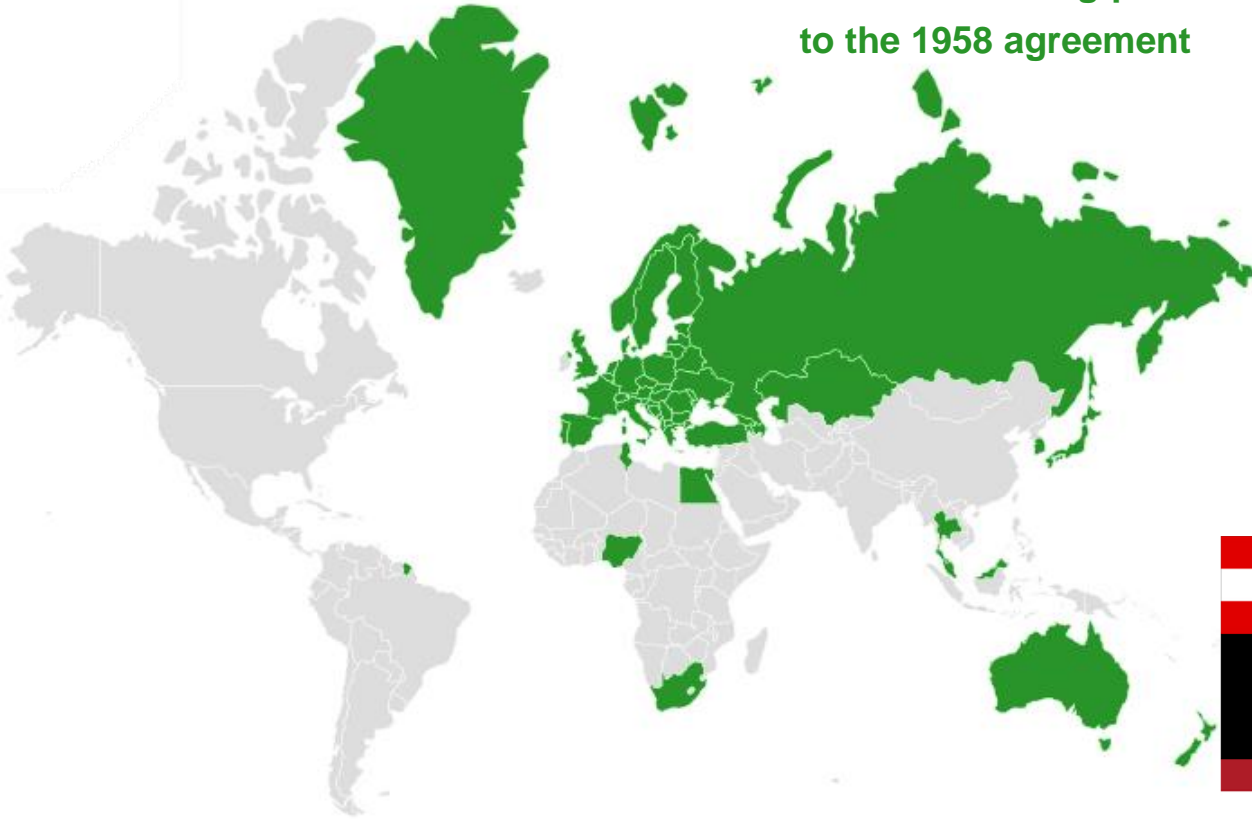


Item	Subject	Regulatory act reference	Applicability										STU or component
			M ₁	M ₂	M ₃	N ₁	N ₂	N ₃	O ₁	O ₂	O ₃	O ₄	
1A	Sound level	Regulation (EU) No 540/2014 of the European Parliament and of the Council (*)	X	X	X	X	X	X					X
2A	Emissions (Euro 5 and Euro 6) light duty vehicles/access to information	Regulation (EC) No 715/2007	X ⁽¹⁾	X ⁽¹⁾		X ⁽¹⁾	X ⁽¹⁾						X
3A	Prevention of fire risks (liquid fuel tanks)	Regulation (EC) No 661/2009 UN Regulation No 34	X	X	X	X	X	X	X	X	X	X	
3B	Rear underrun protective devices (RUPDs) and their installation; rear underrun protection (RUP)	Regulation (EC) No 661/2009 UN Regulation No 58	X	X	X	X	X	X	X	X	X	X	X

I. European Type Approval Systematic

Which kinds of legal requirement are part of the framework regulation?

UNECE contracting parties
to the 1958 agreement



EU27



I. European Type Approval Systematic

The European (EU) type approval systematic allows different kinds of approvals based on European or national requirements:

- EU Whole Vehicle Type Approval (WVTA) in different approaches like single-step, step-by-step or mixed type approval, and multi-stage approval for incomplete or completed vehicles
- EU type-approval of vehicles produced in small series
- EU individual vehicle approvals
- National type-approval of vehicles produced in small series
- National individual vehicle approvals

e24*2018/858*00004*02

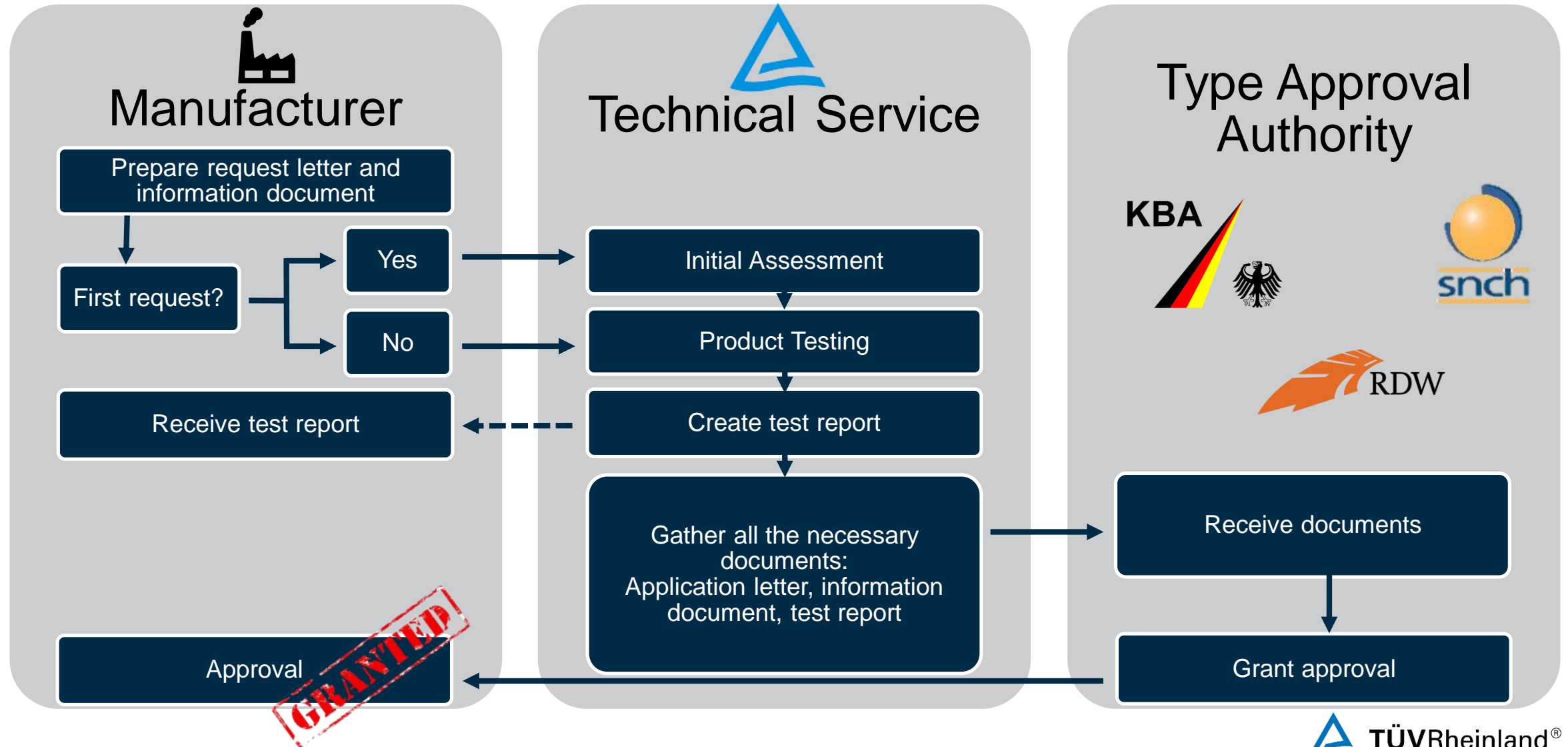
e12*IV18/858*ST0001

e12*NIV18/858*W00001

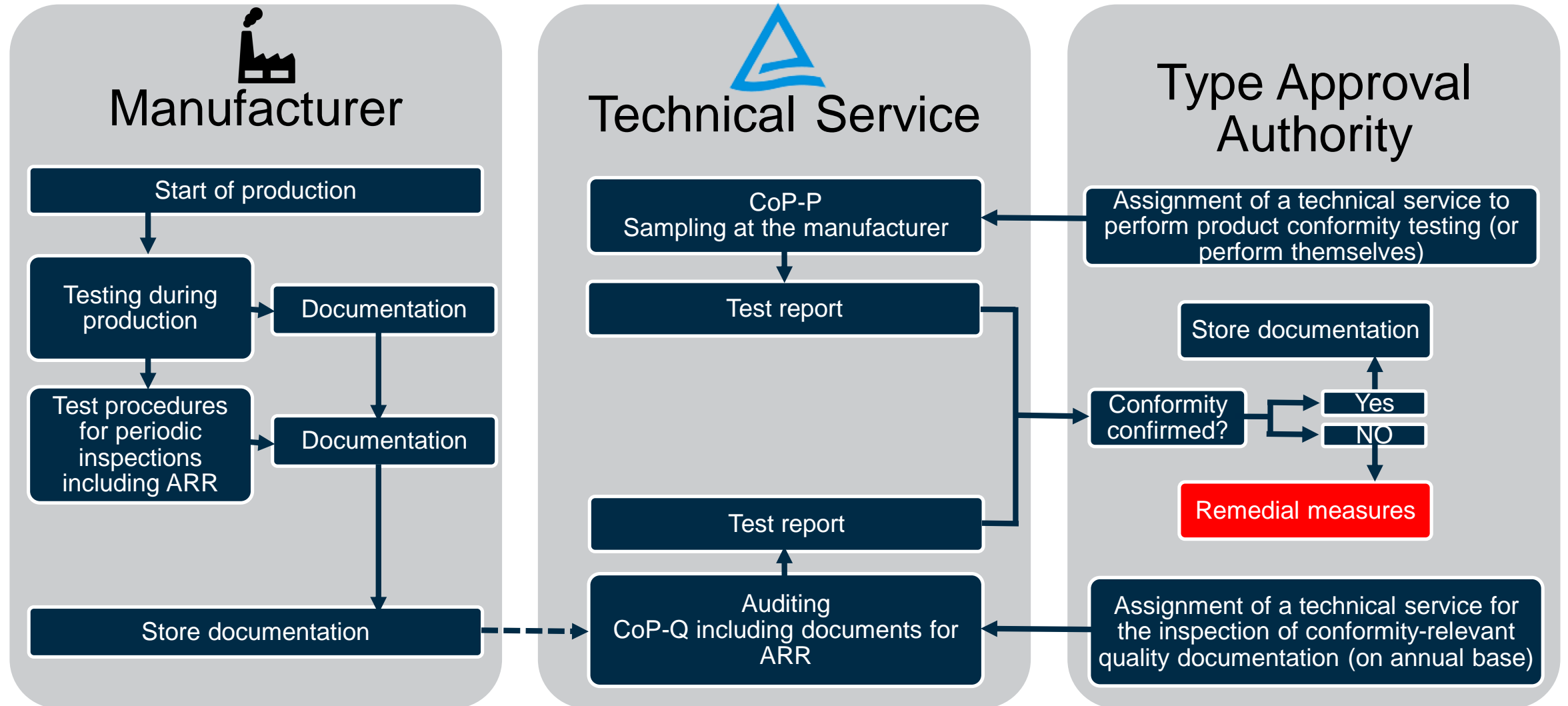
e13*KS18/858*00001*00

e4*NKS18/858*00001*00

I. European Type Approval Systematic – Getting an Approval



I. European Type Approval Systematic – Having an Approval



I. European Type Approval Systematic

- Not in conformity:
 - Manufacturer shall immediately take the **corrective measures** necessary to bring that vehicle [...] into conformity, to **withdraw it from the market or to recall it**, as appropriate
 - The manufacturer shall immediately **inform the approval authority** that granted the type-approval in detail of the non-conformity and of any measures taken




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I. European Type Approval Systematic

NEW!

Market surveillance in the EU

Activities carried out and measures taken by the new Market Surveillance Authorities independently and impartially



- Minimum check of one for every 40.000 new motor vehicles registered in that Member State (preceding year)
- Minimum 20 % emission related tests
- Control/supervision of national authorities by the EU-Commission

On the basis of the reports submitted by Member States, the Commission shall make a summary report on market surveillance activities publicly available on a two-yearly basis.

I. European Type Approval Systematic



What is Market surveillance in the EU?



2019: 4.23 million new vehicles and trailers registered in Germany
→ at least 106 checks need to be performed by the German Market Surveillance Authority



2019: 17.81 million new vehicles registered in the EU-Member States
→ at least 446 checks need to be performed by all MSA together

I. European Type Approval Systematic

Market Surveillance Activities in Germany

Fundamental Affairs

24,156 inquiries +
385 inquiries related to
freedom of information
rights

Field Monitoring

85 tests on vehicles and
vehicle applications
(~ 58 % on diesel
engines)

57 as field tests

16 tests on
software
upgrades
verification

CoP

349 CoP-P
checks
completed

Emissions
(pollutants,
noise and
CO₂)

Safety
(brakes and
steering)

Parts and
components

Product Safety and Recalls

1065
investigations
carried out in
2019

59 % tests
led to recalls

Offences and Sanctions

1211 control
reports
issued

I. European Type Approval Systematic

Penalties in the EU

Member States shall lay down the rules on penalties applicable to infringements.

The EU-Commission may impose administrative fines. These fines shall not be in addition to the penalties imposed by the Member States.

The administrative fines imposed by the Commission shall not exceed:

EUR 30 000

per non-compliant vehicle, system, component or separate technical unit.

effective - proportionate - dissuasive

Emissions Compliance in the EU: Understanding the Fundamentals

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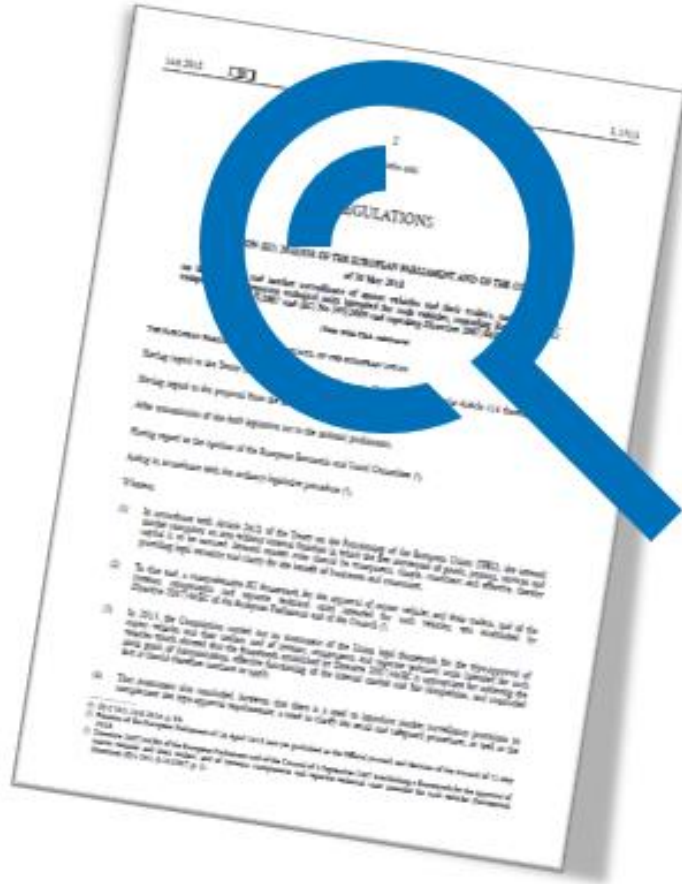
II. Emissions of Light Passenger and Commercial Vehicles

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IV. CO₂ Emissions and Fuel Consumption of Heavy Duty Vehicles

II. Emissions of Light Passenger and Commercial Vehicles

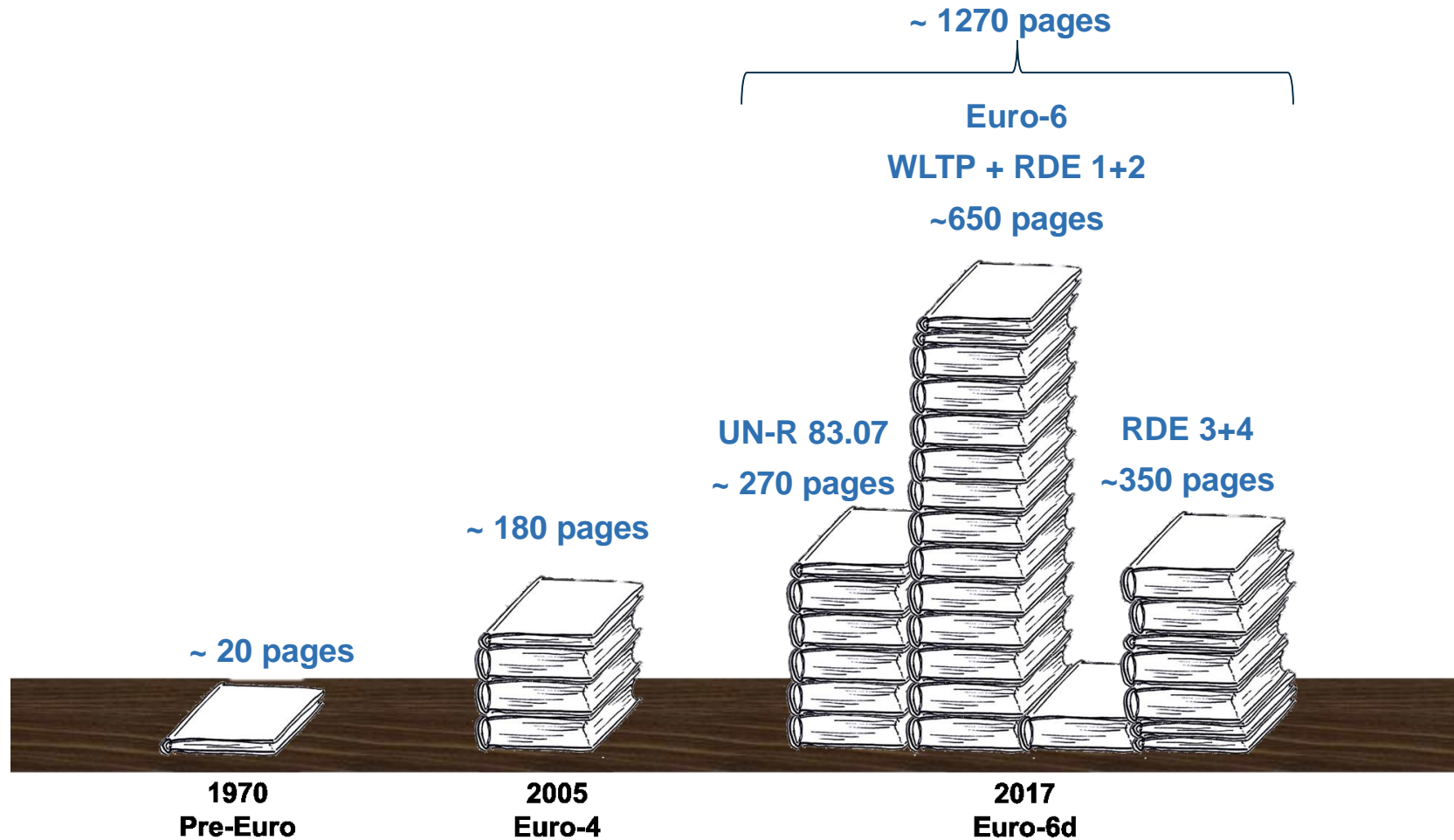
Technical Requirements for Type-Approval and Requirements after Bringing into Market



- a. Timeframe of latest changes from NEDC to WLTC / WLTP
- b. New test cycle WLTC and the European procedure WLTP
- c. Conformity of Production
- d. In service conformity

II. Emissions of Light Passenger and Commercial Vehicles

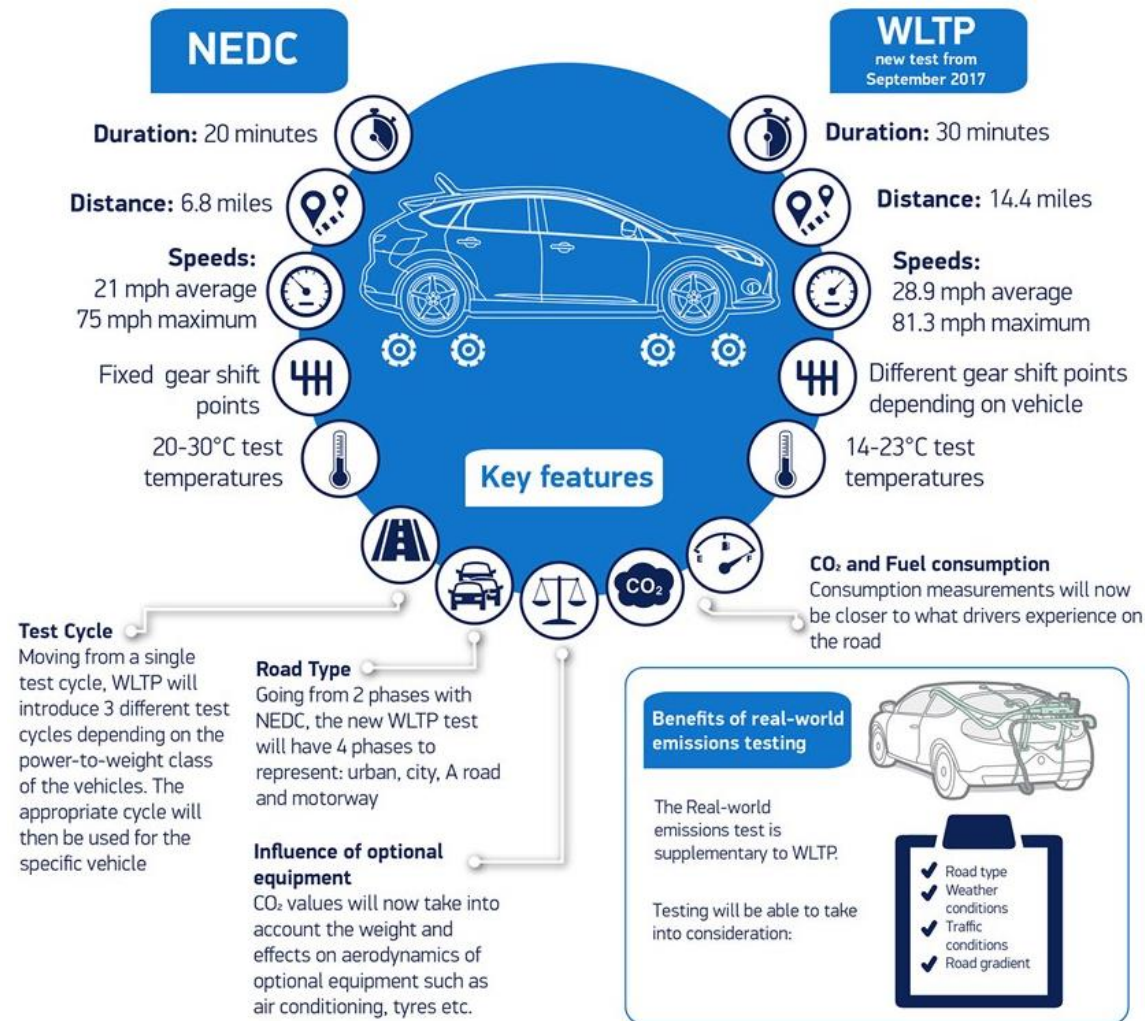
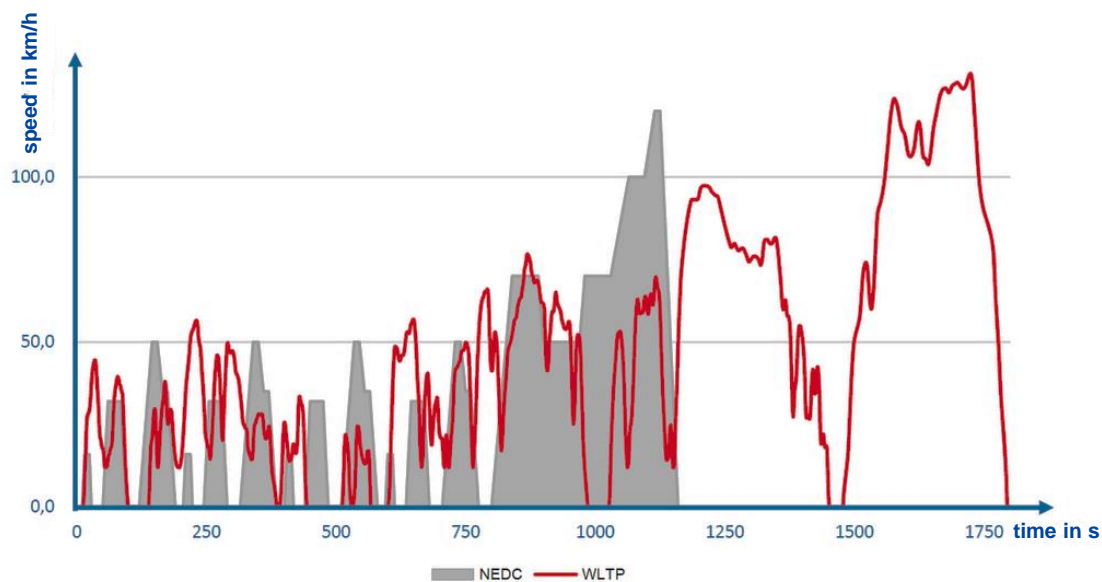
Emissions Regulations Overview - Change in Regulatory Complexity



II. Emissions of Light Passenger and Commercial Vehicles

Emissions Regulations Overview – Changes from NEDC to WLTC

New European Drive Cycle (NEDC) versus
Worldwide Harmonized Light Vehicle Test Cycle (WLTC)



II. Emissions of Light Passenger and Commercial Vehicles

Emissions Regulations Overview

Tests required to obtain an emission approval:

- Type 1 Test - Gaseous pollutants, PM, PN, CO₂ emissions, electrical energy consumption, electrical range
- ATCT - ambient temperature correction test (at 14°C)
- RDE - gaseous pollutants and particle number in real driving conditions
- Type 2 test - idling emissions
- Exhaust opacity (CI engines only)
- Type 3 Test - Crankcase emissions
- Type 4 Test - Evaporative emissions
- Type 5 Test - Durability
- Type 6 Test - Low temperature emissions
- On-board diagnostic systems (OBD)
- Engine power

II. Emissions of Light Passenger and Commercial Vehicles

Emissions Regulations Overview – CoP vs. ISC

Conformity of Production

- approval authority shall verify and agree with arrangements and control plans and perform audits and conduct emission and OBD tests

In-service conformity (ISC)

- Vehicles to be properly maintained and used
- 15.000 km or 6 month – 100.000 km or 5 years, whichever occurs sooner for tailpipe emissions
- 30.000 km or 12 month – 100.000 km or 5 years, whichever occurs sooner for evaporative emissions

Tests to be performed:

Type 1 Test - Gaseous pollutants
emission of CO₂ (or electric energy consumption)

Type 3 Test - Crankcase emissions

Type 4 Test - Evaporative emissions

On-board diagnostic systems (OBD)

Type 1 Test - Gaseous pollutants (incl. low temperature)

Type 4 Test - Evaporative emissions

II. Emissions of Light Passenger and Commercial Vehicles

Emissions Regulations Overview – CoP by the Manufacturer

- Frequency based on a risk assessment methodology (consistent with ISO 31000:2018)
- For type 1 tests a minimum of one verification per 5.000 vehicles produced or once per year, whichever comes first
 - In Europe the VW Golf was the best selling car in 2019 with roughly 460.000 units
 - ~ 92 verifications needed (depending on the structure of the CoP families)
- A sample of three vehicles shall be selected



II. Emissions of Light Passenger and Commercial Vehicles

Emissions Regulations Overview – CoP by the Granting Type Approval Authority (GTAA)

- **has to** verify the manufacturers arrangements and documented control plans with a **minimum** frequency of **one audit per year**
- **may** at any time verify the conformity control methods (in each production facility)
- not satisfied → physical test shall be carried out directly
- normal frequency of physical test verifications is based on the results of the auditing, but **minimum one verification per three years**

Surveillance of the production process

The RDW supervises approvals granted by it by means of:

- › document assessment,
- › audits and
- › a product assessment if necessary.



How often supervision takes place (frequency) depends on any provisions in respect thereof in the legislation as well as a risk analysis carried out by the RDW.

The risk factors may consist, among other things, of the following:

- › the absence of an ISO certificate,
- › results from previous assessments,
- › the nature of the product,
- › the moment of the most recent audit,
- › complaints and
- › information concerning product deviations known to the RDW.

The RDW carries out the audits itself, but also has these carried out by RDW partners or technical services (category C) designated for this purpose by the RDW. This means that manufacturers may also be visited by these organisations instead of the RDW.

II. Emissions of Light Passenger and Commercial Vehicles

Emissions Regulations Overview – ISC by the Manufacturer

- **Shall** perform ISC testing in form of at least Type 1 tests
- **May** perform RDE, Type 4 and Type 6 test
- Shall report all results (using the Electronic Platform)
- Period between starting two ISC checks for a given family shall not exceed 24 month
- Number of sample lots for ISC testing with Type 1 tests
- Sample size: minimum 3 – maximum 10

EU Registrations per calendar year of vehicles in the sampling period	Number of sample lots (for Type 1 tests)
up to 100.000	1
100.001 to 200.000	2
above 200.000	3



II. Emissions of Light Passenger and Commercial Vehicles

Emissions Regulations Overview – ISC by the Granting Type Approval Authority

- Shall check an appropriate number each year
- Shall perform Type 1 and RDE tests on a minimum of 5% of the ISC families per manufacturer per year or at least two ISC families
- Type 4 or Type 6 ISC test have no minimum frequency requirements



II. Emissions of Light Passenger and Commercial Vehicles

Emissions Regulations Overview – Conformity Conclusion – Minimum Test Effort

Manufacturer

CoP

tailpipe emissions

emission of CO₂ (or electric energy consumption)

crankcase emissions

evaporative emissions

OBD

ISC

tailpipe emissions (including low temperature)

Authority

CoP

audit

physical test verification (at least ever three years)

ISC

tailpipe emissions (including low temperature)

RDE

II. Emissions of Light Passenger and Commercial Vehicles

Emissions Regulations Overview – Conformity Conclusion

- KBA list of vehicles including defeat devices (2020-08-11) – in the responsibility of KBA
 - 134 vehicle types (29 engine codes) + 285 VW group models (47 engine codes)
 - Production years 2008 – 2018
 - All vehicles are subject to recall

- KBA list of vehicles including defeat devices (2020-08-11) – **not** in the responsibility of KBA
 - 18 vehicle types (16 engine types)

Liste der betroffenen Fahrzeugvarianten außerhalb des Zuständigkeitsbereiches des KBA											
Marke	Handelsbezeichnung	Hubraum	Leistung	Motorkenn- buchstabe	Typ/ Variante / version	Emissions- stufe	Genehmigungsnummer Gesamtfahrzeug	zuständige Genehmigungsbehörde hinsichtlich der Emissionen	Feststellungs- datum	Emissionsstrategie	Keine hinreichende Begründung gemäß Artikel 5 Absatz 2 der VO (EG) Nr. 715/2007:
		[cm]	[kW]								
Chevrolet	Cruze	1998	120	Z20D1	KL13 / JNF11 / FJ5	Euro 5	e4*2001/116*0140*09	RDW (NL)	April 2016 (UK-Bericht)	Reduzierung der Wirksamkeit des Systems zur Abgasrückführung (AGR)	Information der zuständigen Typgenehmigungsbehörde und der EU-Kommission
Dacia	Sandero	1769	66	K9K E6	SD / SDDCJ / SDDCJS	Euro 6	e2*2001/116*0314*76	CNRFV (FR)	April 2016 (UK-Bericht)	Reduzierung der Wirksamkeit des Systems zur Abgasrückführung (AGR)	Information der zuständigen Typgenehmigungsbehörde und der EU-Kommission
Fiat	500X	1956	103	XB	334 / AXB22 / D1A	Euro 6	e3*2007/46*0318*02	MIT (IT)	April 2016	Reduzierung der Wirksamkeit des Systems zur Abgasrückführung (AGR)	Information der zuständigen Typgenehmigungsbehörde und der EU-Kommission
Fiat	Ducato	2999	130	F1CE348 1E	250 / CPMFC / EY	Euro 5	e3*2007/46*0044*08	MIT (IT)	April 2016 (UK-Bericht)	Reduzierung der Wirksamkeit des NOx- Speicher-Katalysators (LNT - Lean NOx-Trap)	Information der zuständigen Typgenehmigungsbehörde und der EU-Kommission
Ford	C-Max	1499	88	XWDB	DXA / XWDBIV / SHA1NA	Euro 6	e13*2007/46*1103*15	VCA (UK)	April 2016 (UK-Bericht)	Reduzierung der Wirksamkeit des Systems zur Abgasrückführung (AGR)	Information der zuständigen Typgenehmigungsbehörde und der EU-Kommission
FCA (Jeep)	Cherokee	1956	125	unbekannt	KL / JETCT / FSHD1A	Euro 5	e4*2007/46*0783*04	MIT (IT)	April 2016 (UK-Bericht)	Reduzierung der Wirksamkeit des Systems zur Abgasrückführung (AGR)	Information der zuständigen Typgenehmigungsbehörde und der EU-Kommission
Hyundai	ix35	1995	100	D4HA	ELH / FSDQ4 / A63AZ1	Euro 5	e11*2007/46*0192*08	VCA (UK)	April 2016 (UK-Bericht)	Reduzierung der Wirksamkeit des Systems zur Abgasrückführung (AGR)	Information der zuständigen Typgenehmigungsbehörde und der EU-Kommission
Hyundai	i20	1120	55	D4HA	GB / BSD11 / M62BZ	Euro 6	e11*2007/46*1600*01	VCA (UK)	April 2016 (UK-Bericht)	Reduzierung der Wirksamkeit des Systems zur Abgasrückführung (AGR)	Information der zuständigen Typgenehmigungsbehörde und der EU-Kommission
Jaguar (Land Rover)	XE	1999	120	204DTD	JA / C / 504	Euro 6	e11*2007/46*2150*00	VCA (UK)	April 2016 (UK-Bericht)	Reduzierung der Wirksamkeit des Systems zur Abgasrückführung (AGR)	Information der zuständigen Typgenehmigungsbehörde und der EU-Kommission
Land Rover	Range Rover	2993	190	306DT	LG / SKY2F / D5Z1	Euro 5	e11*2007/46*0649*05	VCA (UK)	April 2016 (UK-Bericht)	Reduzierung der Wirksamkeit des Systems zur Abgasrückführung (AGR)	Information der zuständigen Typgenehmigungsbehörde und der EU-Kommission

II. Emissions of Light Passenger and Commercial Vehicles

Emissions Regulations Overview – Emission Targets in the EU

- Introduce “post Euro 6” standards
 - Currently a high level concept
 - Stake holder discussion ongoing
 - Potential changes: increase of mileage for ISC and MSA, increase of durability, introduction on wide on-road testing (more than RDE) to cover conditions not controlled in Euro 6, technology and fuel-neutral lower limits
 - New technologies: pre-heated catalyst and full map lambda = 1
- Reduction of greenhouse gasses compared to 1990
 - Target changed from 40 % to 55 % reduction in 2030 (December 2020)
- Green Deal
 - Greenhouse gas neutral in 2050
 - EU-COM defined 50 measures required for this purpose

Emissions Compliance in the EU: Understanding the Fundamentals

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- IV. CO₂ Emissions and Fuel Consumption of Heavy Duty Vehicles

III. Emissions of Heavy Duty Vehicles

Emissions Regulations Overview

1. Regulation (EC) No. **595/2009**
on **type-approval** of motor vehicles and engines with respect to emissions from heavy duty vehicles (Euro VI)...
2. Regulation (EU) No. **582/2011**
implementing and amending Reg. (EC) No 595/2009 [...] with respect to emissions from heavy duty vehicles...
3. UN-Regulation **No. 49**
[...] **gaseous and particulate pollutants** from CI engines and PI engines for use in vehicles
4. Vehicle Energy Consumption Calculation Tool (**VECTO**) & Regulation (EU) No. **2017/2400**
implementing [...] as regards the determination of **the CO₂ emissions and fuel consumption** of HDV

III. Emissions of Heavy Duty Vehicles

Emissions Regulations Overview

- Technical requirements for type approval of:
 - Motor vehicles
 - Engines
 - Replacement parts
 - Durability of pollution control devices
 - OBD systems
- Definition of:
 - Emission Limits
 - Fuel consumption / CO₂
 - Conformity of Production
 - In-service conformity



III. Emissions of Heavy Duty Vehicles

Emissions Regulations Overview

Article 5

Requirements and tests

1. Manufacturers shall ensure compliance with the emission limits set out in Annex I.
2. Manufacturers shall equip vehicles and engines so that the components likely to affect emissions are designed, constructed and assembled so as to enable the vehicle or engine, in normal use, to comply with this Regulation and its implementing measures.
3. The use of defeat strategies that reduce the effectiveness of emission control equipment shall be prohibited.

ANNEX I

Euro VI 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⁾ $6,0 \times 10^{11}$

Note:

PI = Positive Ignition.

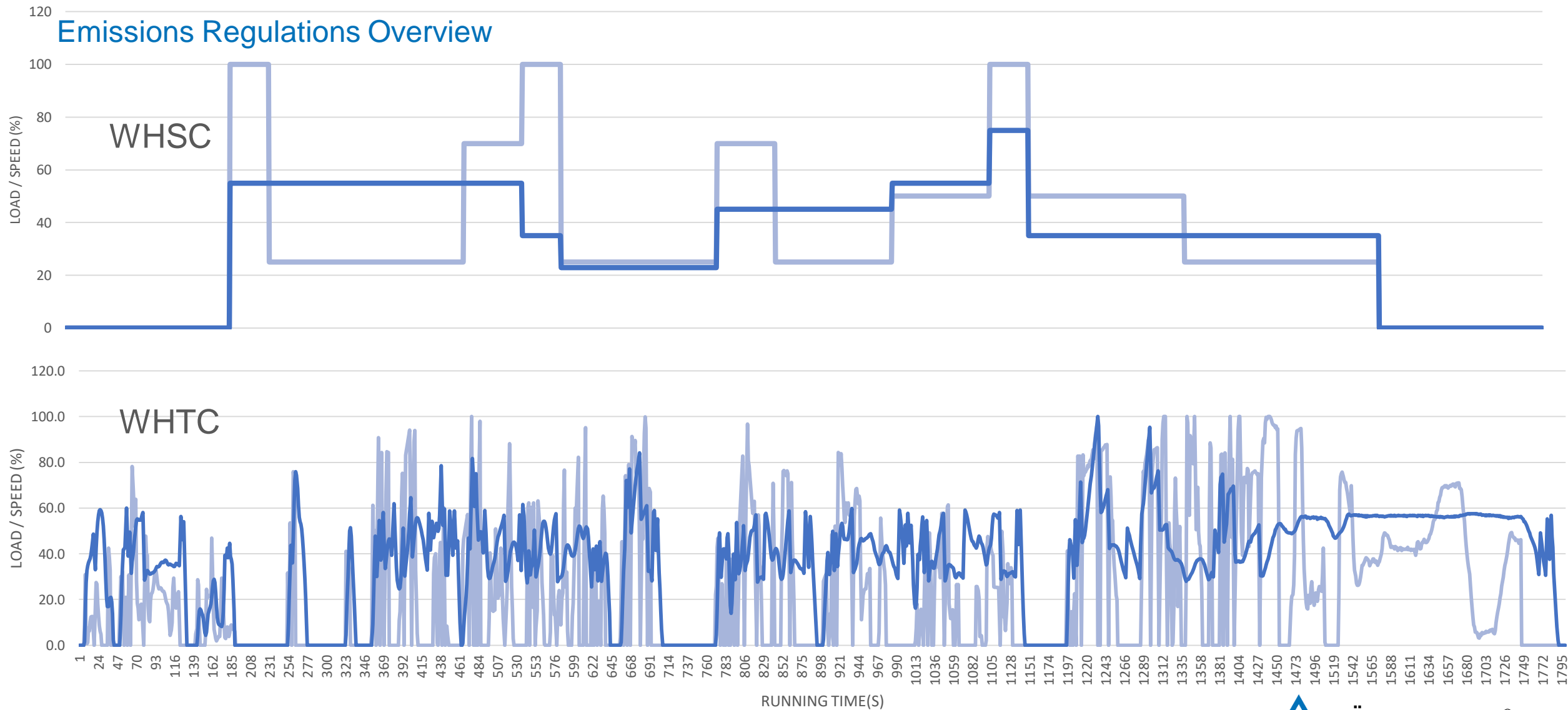
CI = Compression Ignition.

⁽¹⁾ The admissible level of NO₂ component in the NO_x limit value may be determined at a later stage.

⁽²⁾ The limit value shall apply as from the dates set out in row B of Table 1 of Appendix 9 of Annex I to Regulation (EU) No 582/2011.

III. Emissions of Heavy Duty Vehicles

Emissions Regulations Overview



III. Emissions of Heavy Duty Vehicles

Emissions Regulations Overview – CoP and ISC

CoP

- Referring to framework regulation
- Engines taken randomly from series production
- Three engines shall be taken for testing
 - Newly manufactured engines
 - May have run-in up to 125 hours
- For the testing procedure the Regulation refers to UN-R 49

ISC

- Report schedule and sampling plan at the time of initial TA
- Minimum of three engines to be tested (three vehicles)
- Testing on the road over normal driving patterns, conditions and payloads → prove the choice towards TAA
- Defined payload, ambient conditions, vehicle conditions
- Trip requirements defined for different vehicle classes
 - N2, M2, M3 → 45 % urban, 25 % rural, 30 % motorway
 - N3 → 30 % urban, 25 % rural; 45 % motorway
- Emission evaluation is allowed to include conformity factor of 1,5
- Send report to GTAA

III. Emissions of Heavy Duty Vehicles

Emissions Regulations Overview

Remedial Measures:

- Submit remedial actions within 60 days to GTAA and receive confirmation within another 30 days
- Submit to GTAA within the plan:
 - Each affected engine type
 - Details of modifications, corrections, repairs, adjustments to be done
 - Copy of manufacturers information to vehicle owners
 - Copy of instructions to persons who will perform the repair
- Report regularly to GTAA

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IV. CO₂ Emissions and Fuel Consumption of Heavy Duty Vehicles

Emissions Regulations Overview

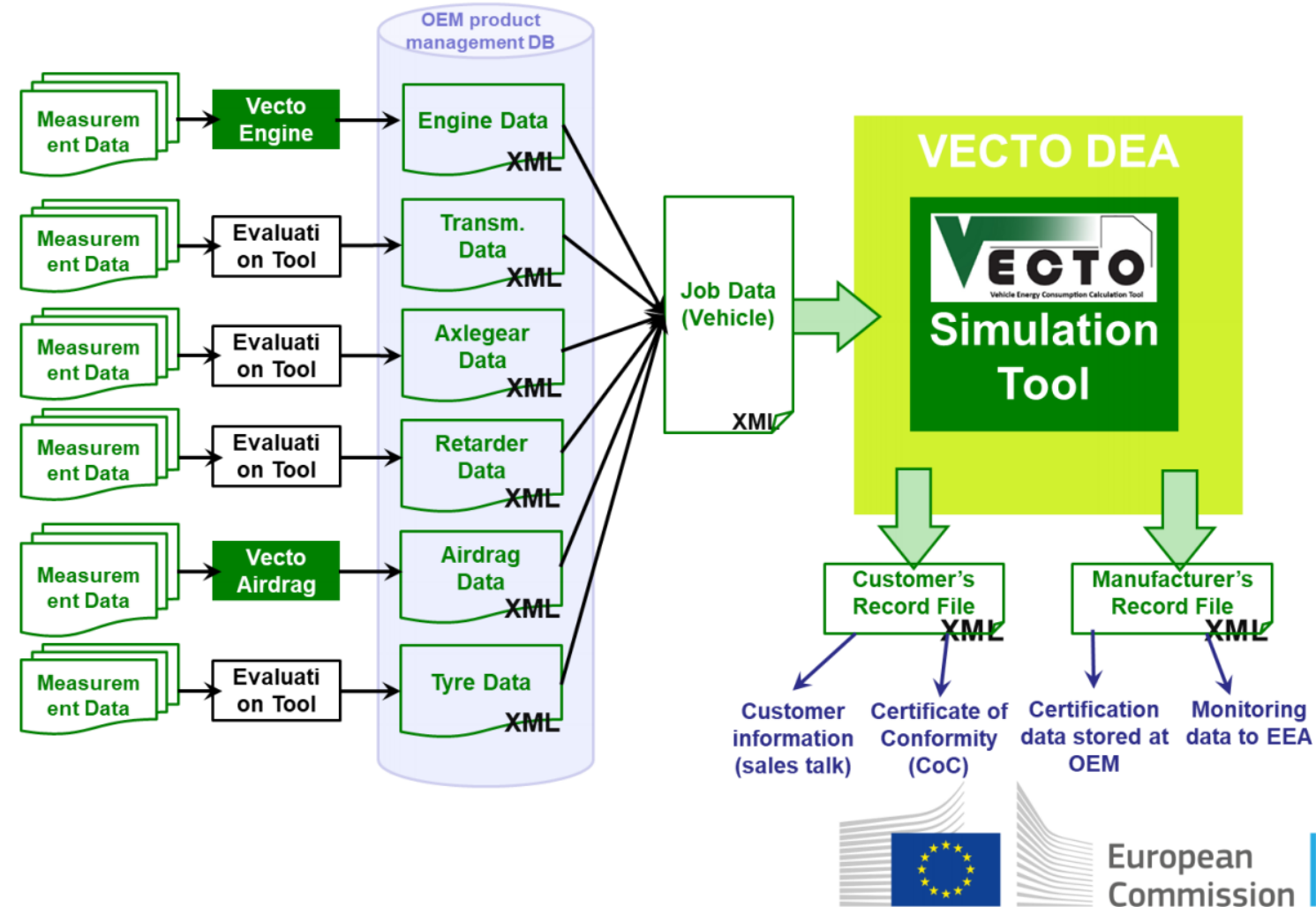
Due to multiple combinations of axle types, number of driven axles, gear boxes, engines and cabins, the number of variations within one HDV model range can exceed 1000. Therefore measuring every possible configuration on a chassis dynamometer or with PEMS would be a very burdensome approach.



IV. CO₂ Emissions and Fuel Consumption of Heavy Duty Vehicles

Emissions Regulations Overview

- Every vehicle gets an individual VECTO result
- All data shall be handled in electronic form
- Data integrity measures installed („hashing“)

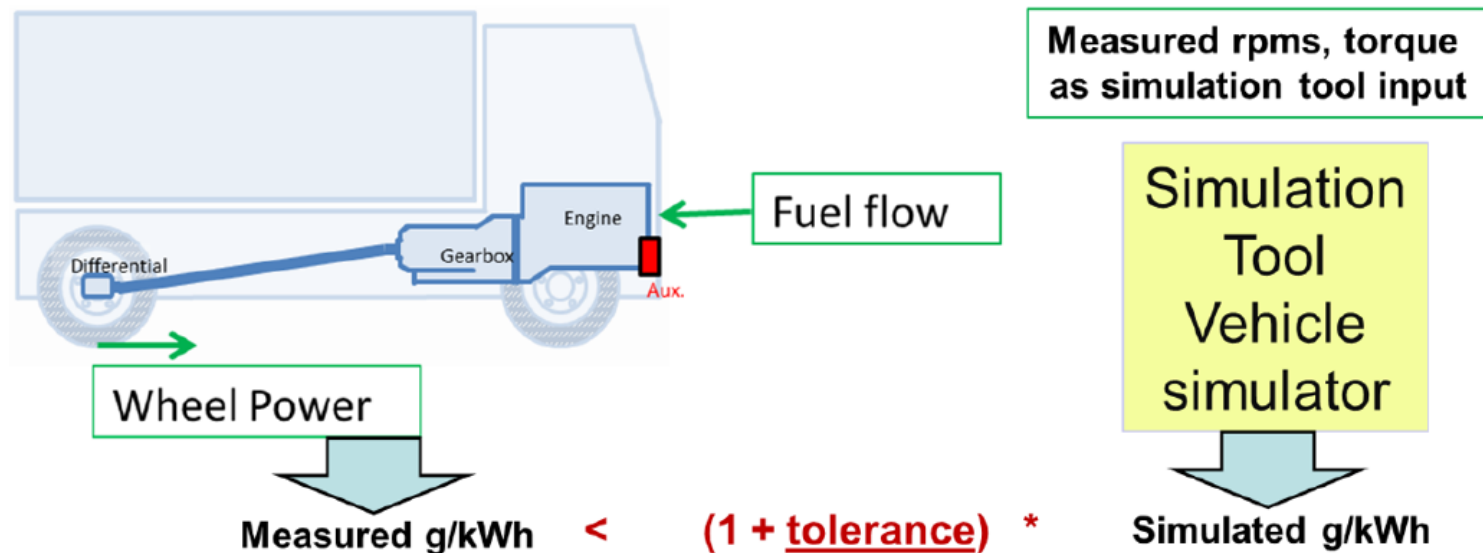


IV. CO₂ Emissions and Fuel Consumption of Heavy Duty Vehicles

Emissions Regulations Overview

Verification Test Procedure (VTP)

- On-road test to verify CO₂ Emissions
- Carried out by manufacturer and verified by GTAA
- Pass/Fail check: specific fuel consumption from VTP to be lower than VECTO simulation results +7,5 % tolerance



IV. CO₂ Emissions and Fuel Consumption of Heavy Duty Vehicles

Conformity of CO₂ Emissions and Fuel Consumption Related Properties

Engine

- 0,05 % of all engines produced in the past production year but a minimum number of 30 (=n_{COP,base})
- first two CO₂ -families shall be those with the highest production volumes
- Sample size per family $4 < n < 19$
- Margin of 4 % for a single test



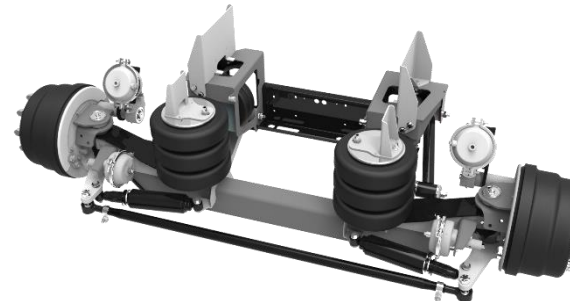
Transmission

- Number of tests depending on production of transmissions
e.g.:
>10.000-30.000 => 2
>30.000 => 3
>100.000 => 4
- Above a production of 10.000 the transmission with highest production volume needs to be tested
- Margin of up to 3 % depending on the type of transmission



Axle

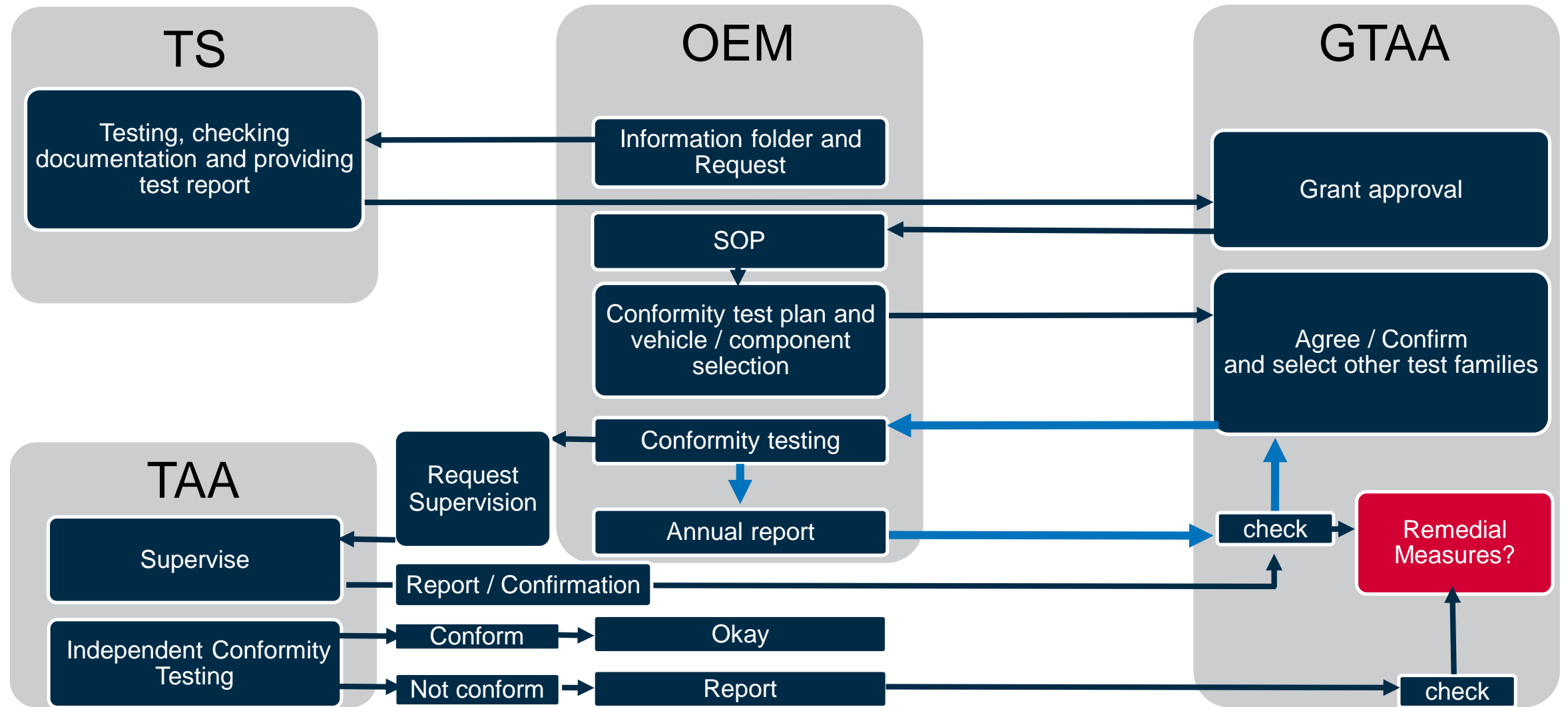
- Number of tests depending on production of axles
e.g. for single reduction (SR) axles:
50.001-60.000 => 3
60.001-70.000 => 4
70.001 and more => 5
- first two axle-families shall be those with the highest production volumes
- Margin of 1,5 % for SR axles and torque loss measurements



Air drag

- Number of tests depending on production of vehicles
e.g.:
 $\leq 50.000 \Rightarrow 3$
 $\leq 75.000 = 4$
 $< 100.001 = 6$
- first two air drag-families shall be those with the highest production volumes
- Additional requirements like ambient temperature within a range of $\pm 5\text{ }^{\circ}\text{C}$ and high speed test within a range of $\pm 2\text{ km/h}$ of certification tests
- Margin of 7,5 %

IV. CO₂ Emissions and Fuel Consumption of Heavy Duty Vehicles



IV. CO₂ Emissions and Fuel Consumption of Heavy Duty Vehicles

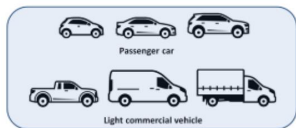
Emissions Regulations Overview – Emission Targets in the EU

- Regulation (EU) 2019/1242 reduction of the CO₂ level of 2005 by:
 - 15 % by 2025
 - 30 % by 2030
 - Emissions premium 4.250 €/gCO₂/tkm from 2025
 - Emissions premium 6.800 €/gCO₂/tkm from 2030

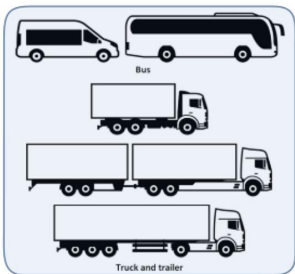


Emissions Compliance in the EU: Understanding the Fundamentals

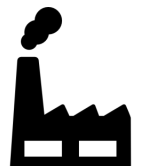
Summary



Light Duty Vehicles



Heavy Duty Vehicles



Key Takeaways: EU v. US

Both EU and US regulations require extensive documentation and testing for Emission Approvals

- US: Manufacturers work directly with US EPA and CARB to submit Applications for Certification
 - EPA and CARB requirements are very similar but require independent approvals, for every Model Year
- EU: Manufacturers work through Technical Service to submit Applications for Type Approval to governmental Authorities in any one of 27 different Member States
- Test cycles, documentation formats, and other regulatory requirements are generally similar but are not identical between US and EU

Both EU and US regulations require compliance demonstrations on production vehicles

- New vehicles: Manufacturer requirements
 - Production Vehicle Evaluation Testing, In-Use Verification Program testing in US
 - Conformity of Production testing in EU
- In-Service vehicles: Agency enforcement
 - Separate In-Use Compliance programs at US EPA and CARB, in place for 40+ years
 - Member State activity increasing in recent years



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Thank you for your attention.

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