UNECE
Inland Transport Committee

UN vehicle regulations agreements Activities related to Heavy Duty Vehicles Fuel Economy

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Content

I. WP.29
   a) WP.29 Activities
   b) WP.29 scope and organization

II. The tools of WP.29
   a) Vehicle approval: the 1958 Agreement
   b) Vehicle certification: the 1998 Agreement
   c) Periodic technical inspections (PTI): the 1997 Agreement

III. Latest activities on Heavy Duty Fuel Economy

Content

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The World Forum for Harmonization of Vehicle Regulations (WP.29)

- UNECE Sustainable Transport Division: secretariat to WP.29 for more than 60 years
- WP.29 is:
  - the unique worldwide regulatory forum for the automotive sector
  - administrating three Multilateral UN Agreements

Construction regulations

1958 Agreement – Type Approval Regulations with mutual recognition of the type approvals

1998 Agreement – Global Technical Regulations

In Use PTI regulations

1997 Agreement – Adoption of Uniform Conditions for Periodical Technical Inspections of Wheeled Vehicles and the Reciprocal Recognition of Such Inspection

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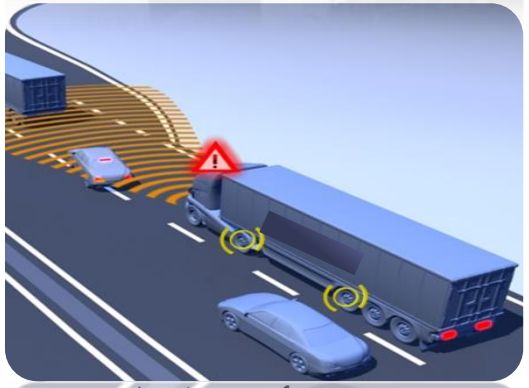
What is WP.29 doing?

Emissions of pollutants and CO_2

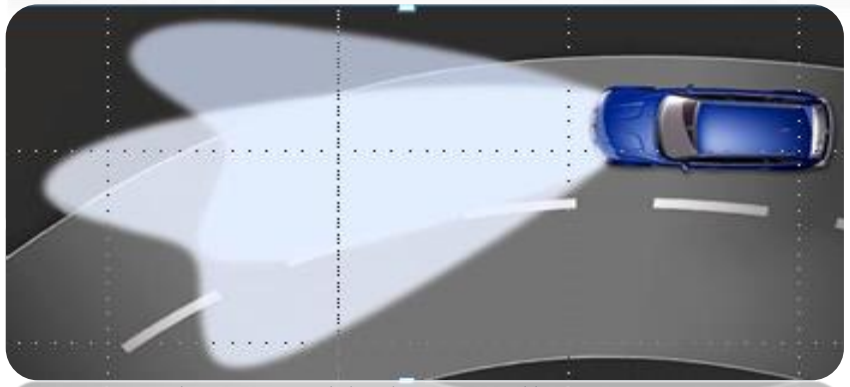
General safety

Passive safety

Noise



Active safety



Lighting and light signalling

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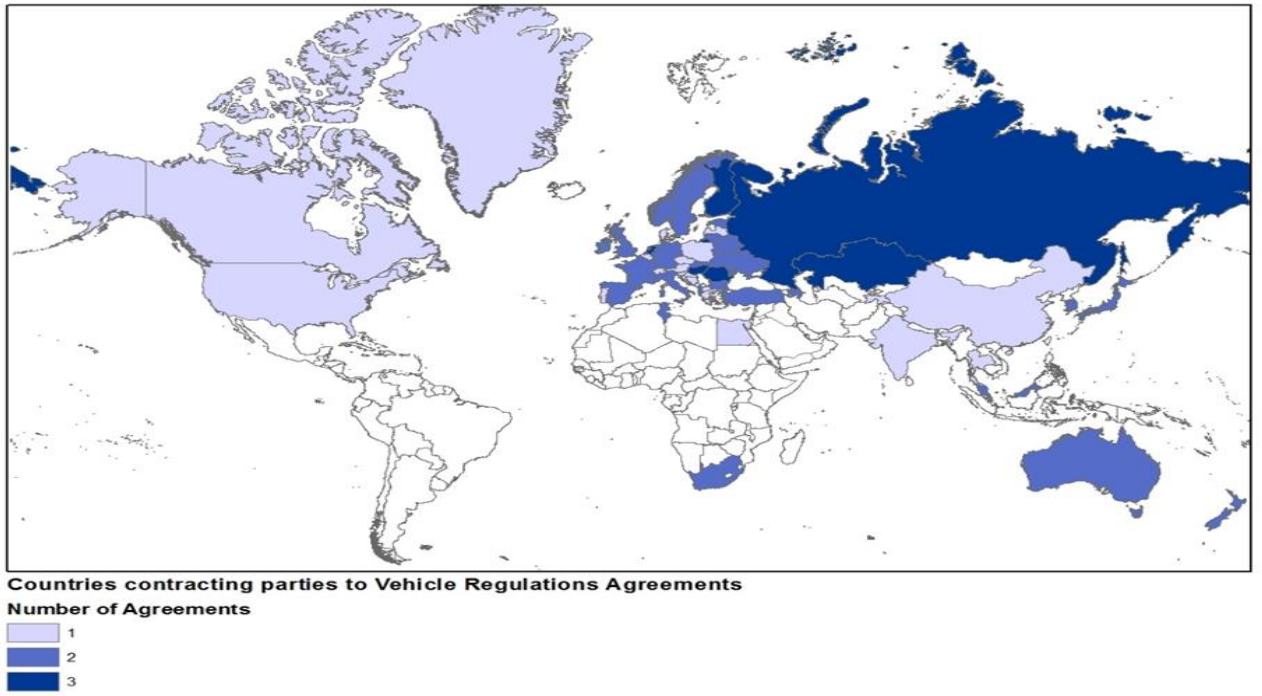
WP.29 is worldwide, unique and transparent

- Agreements open to all Nations of the UN
- Participation open to States, Governmental Organizations (GOs) and NGOs, but

Decisions are taken by

Governments (of CPs)



No other worldwide organization covers this area

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Principal Elements of the 1958 Agreement

Eligible Contracting Parties to the 1958 Agreement:

Members of UN

The 1958 Agreement provides:

Legal framework for the adoption of uniform UN Regulations on the vehicle construction

Reciprocal recognition of Type Approval
Approved once and accepted everywhere(CPs)

Elimination of barriers to trade

Principal Elements of the 1958 Agreement

- All vehicle parts and systems approved according to UN Regulations under the 1958 Agreement bear the unique (E) -marking

E stands for Excellence Effective Economic Efficient…

- The **Type-Approval** with an approval number and the approval date + test reports

Current Status

- More than 140 Regulations annexed to the 1958 Agreement
- Covering all kind of products and their parts

- Evolution of the Agreement (Revision 3):
  - Entry into force: 14 September 2017
  - Possibility to apply former versions of a Regulation
    (e.g. possibility to use EURO 4 or EURO 5 while there is now at EURO 6)
  - DETA (Database of the exchange of Type Approval documentation)

Principal Elements of the 1998 Agreement

Eligible Contracting Parties to the 1998 Agreement:

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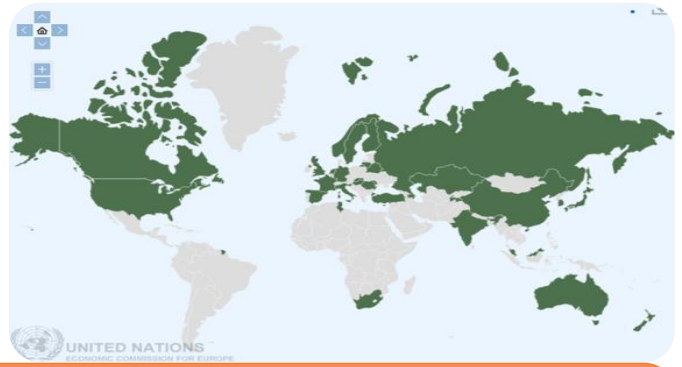

The 1998 Agreement provides:

Legal framework for the adoption of uniform Global Technical Regulations
– UN GTRs -

No administrative provisions
(for self certification and homologation)

Principal Elements of the 1998 Agreement

Contracting Parties to the 1998 Agreement

Commit themselves to implement a GTR into national legislation, when voting in favour

Need a system/agency for market surveillance and enforcement of production compliance

The 1998 Agreement requests

Regular reporting by Contracting Parties on the implementation of GTRs in their national law

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Heavy Duty Fuel Economy

- HDV FE measurements and standards enforced and/or considered in all major markets
- Methodologies to measure FE/CO2 emissions from trucks differs from country to country

- Industry representative and contracting parties willing to harmonize measurement procedure

Steps for Harmonization

Elements	Sub-Elements	Issues	Examples
FE Unit	-	Transport efficiency or Easy to understand for everybody	- km/L - ton.km/L
Others	Criteria	Limit of FE value or average value	- Averaged by number of sales - CAFÉ
Vehicle classification	-	Simpler category is desired, but needs to reflect to real world compexity	- Vehicle type (Tractor, bus….etc) - GVW, type of cabin
Items of FE effect	-	Accuracy vs. cost of measurement Contribution for FE	- Engine, T/M - Aero dynamic and rolling resistance
Driving Mode	-	Vehicle speed base or road data base less complexity vs real world reflection	- Combination of two cycles - Unique mode for each vehicle type
Measurement Method	Chassis dynamometer	Should Chassis dynamometer measurement be used	
	Simulation	Should simulation be used Driver model contents	- Common calculation logic - Difference of steady and transient
	Engine measurement	Number of measurement points Transient operation effect	- CO2 measurement by engine - Engine FE map and simulation
	Aero dynamic measurement	Measurement methods Selection of vehicle type, rear body	- Coast down, steady speed drive - CFD - Wind tunnel
	Tyre rolling resistance	Measurement method, labeling	- Common tyre measurement method - How to handle a number of axis
	Others	Measurement method	- Driveline drag, Auxiliary drag, etc

Source:OICA

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First step

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Second step

First step

Source:OICA

Key Elements of FE Measurement

- **Simulation**

Simulation is introduced to evaluate HDV with fuel efficiency.

Mathematical method of simulation seems similar for each software.

Input data differs because of the difference of concept or FE items.

Classification	Item	Status of each region				Remarks
		EU /VECTO	US/GEM (Phase Ⅱ)	China	Japan (FES2025)	
Vehicle Parameters	Vehicle Category	✔	✔	✔	✔	
	Curb Weight	✔	✔	✔	✔	
	Gross Vehicle Weight	✔	✔	✔	✔	
	Maximum Payload	✔	✔	✔	✔	
	Gross Combination Weight	✔	✔	✔	✔	
	Rated Passenger Capacity	✔	✔	✔	✔	
	Axle Configuration	✔	–	✔	–	
	Axle Number	✔	–	✔	–	
	Aero drag (Cd)	✔	✔	✔	✔	
	Auxiliary	(✔) *	–	–	–	* By spec. of technology
Engine Parameters	Engine Fuel Map	✔	✔	✔	✔	
	Full Load Engine Torque	✔	✔	✔	✔	
	Motored Engine Torque	✔	✔	✔	✔	
	Idling Speed	✔	✔	✔	✔	
	Rated Engine Speed	✔	✔	✔	✔	
	Maximum Engine Speed	✔	✔	✔	–	
	Transient Engine Map	–	✔	–	–	
Drive train	Transmission type	✔	✔	–	✔	MT,AT,AMT
	Number of gear	✔	✔	✔	✔	
	Transmission gear ratio	✔	✔	✔	✔	
	Transmission drag	✔	✔	–	✔	
	Final reduction gear ratio	✔	✔	✔	✔	
	Drive axle drag	✔	✔	–	✔	
Tire	Rolling radius	✔	✔	✔	✔	
	Rolling resistance	✔	✔	✔	✔	

Source:OICA

Heavy Duty Fuel Economy

- Contracting Parties have shown interest in developing the activity

- 1-day workshop during the WP.29/GRPE January 2019 session
- Likely on 7th of January 2019
- Co-organized by OICA and UNECE

- Participants welcome

Conclusion:
The advantages of international tech. regs

For the business sector:

- The "safe harbor"
- Harmonized requirements
- Simpler export (less/no technical barrier)
- Less uncertainty about market acceptance

For Countries and their citizens:

- Safety
- State of the art technologie
- Better trade
- Interoperability
- Facilitated border crossing

THANK YOU FOR YOUR ATTENTION

UNECE Sustainable Transport Division

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