Informal document GRSG-118-28
(118th GRSG, 15-17 July 2020

Agenda item 9)

GRSG 118th session

UN Regulation No. 93
OICA comments to proposal

ECE/TRANS/WP.29/GRSG/2020/10 (EC)
based on
ECE/TRANS/WP.29/GRSG/2019/19
as amended by
GRSG-117-48

Summary

- Context
- Active safety measures
- Importance of the definition of G category
- Off-road vehicles as “machinery on wheels”
- Conclusion

GPS

- **Context**
- Active safety measures
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3 proposals

Context

ECE/TRANS/WP.29/GRSG/2020/10 contains 3 proposals :

1. **Amendment to scope** ☒ **Challenged by OICA**

   Removing category G vehicles exemptions to reduce the possibility of inappropriate exemptions

2. **Elongated cabs** ☑ **Supported by OICA for fast introduction (2020)**

   Introduction of new configurations for complying with strong CO_2 requirements

3. **Test setup** ☑ **Supported by OICA for fast introduction (2020)**

   improving approval efficiency

Amendment to scope

Context

- Current:

1.3. The requirements to this regulation do not apply to:
1.3.1. off-road vehicles of category N2G and N3G
1.3.2. vehicles such that their use is incompatible with the provisions of front underrun protection.

- EC proposal:

Paragraph 1.3., amend to read:

1.3. Vehicles where any FUP (e.g. fixed, removable, foldable, adjustable, etc.) is incompatible with their on-road use may be partly or fully exempted from this Regulation, subject to the decision of the Type Approval Authority.

Paragraphs 1.3.1. and 1.3.2. shall be delete

Off-road vehicles

Context

- Low number of vehicles
- Global truck configuration
- Machinery on wheels for professionals
- Operation in construction sites
- National certification and registrations

GPS

- Context
- **Active safety measures**
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Active safety measures

Active safety measures

- Active safety systems prevent/avoid the accident while FUP only mitigates the consequences of the accident.

- Active safety functions are currently progressively introduced
  - VRU detection – Vulnerable Road User
  - LDWS – Lane Departure Warning System
  - CSF – Corrective Steering Function
  - ESF – Emergency Steering Function
  - ACSF-B1 – Automatically Commanded Steering Function
  - ALKS - Automatic Lane Keeping System
  - AEBS - Advanced Emergency Braking System…

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Importance of G-category in § 1.3

G category

- **Benefits of referring G category in scope**
  - **Harmonization**: Current text refers to definitions common to all contracting parties (RE.3)
  - **Discriminative tool**: Reference to G category is the best tool to discriminate the vehicles to exempt
  - **Others regulations**: The Category G definition is used in multiple regulations where there are specific off-road requirements.

- **Consequences of not referring to G category in scope**
  - **Regulated requirements**: Isolation of UN R93 from the other regulated texts referring to the category G vehicles.
  - **Contradictions** with national and regional off-road legislations/authorities.
  - **Fragmentation** of the market
  - **Loss of one criterion** (approach angle) in G category identification

Loss of one criterion

G category

- Compliance with UN R58 and R73 already limits flexibility in reaching the 6 criteria
- UN R93 FUP would remove 1 criterion from the list of 6 criteria

Worst case criteria for N2 G-vehicles from the 2007/46/EC

Requirements N2

4.2. M 2 , **N 2** or M 3 vehicles whose maximum mass does not exceed 12 tonnes shall be subcategorised as off-road vehicles if they satisfy the condition set out in point (a) or both conditions set out in points (b) and (c):

a) all their axles are driven simultaneously, irrespective of whether one or more powered axles can be disengaged;

OR

b)
(i) at least one front and at least one rear axle are designed to be driven simultaneously irrespective of whether one powered axle can be disengaged;
(ii) at least one differential locking mechanism or a mechanism having the same effect is fitted;
(iii) they are able to climb a 25 % gradient as a solo vehicle;

c) they satisfy at **least five out of the following six requirements** if their maximum mass does not exceed 7,5 tonnes and at **least four** if their maximum mass exceeds 7,5 tonnes:
(i) the approach angle shall be at least 25 degrees;
(ii) the departure angle shall be at least 25 degrees;
(iii) the ramp angle shall be at least 25 degrees;
(iv) the ground clearance under the front axle shall be at least 250 mm;
(v) the ground clearance between axles shall be at least 300 mm
(vi) the ground clearance under the rear axle shall be at least 250 mm.

Criteria in RE3 for N2 and N3

Requirements N3

4.3. M 3 **or N 3** vehicles whose maximum mass exceeds 12 tonnes shall be subcategorised as off-road vehicles if they satisfy the condition set out in point (a) or both conditions set out in points (b) and (c):

a) all their axles are driven simultaneously, irrespective of whether one or more powered axles can be disengaged;

OR

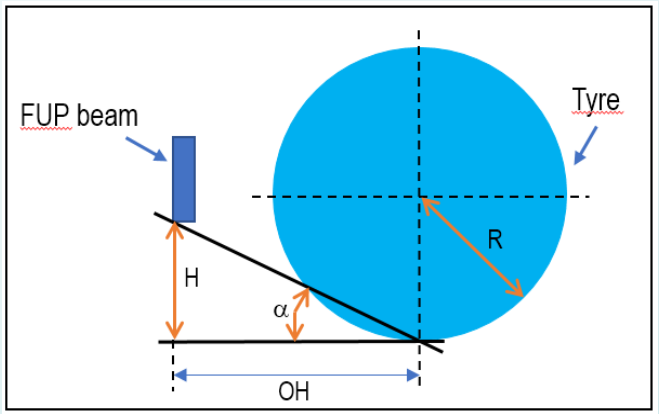
b) .
(i)at least half of the axles (or two axles out of the three in the case of a three axle vehicle and mutatis mutandis in the case of a five axle vehicle) is designed to be driven simultaneously, irrespective of whether one powered axle can be disengaged;
(ii) there is at least one differential locking mechanism or a mechanism having similar effect;
(iii) they are able to climb a 25 % gradient as solo vehicle;

c) they satisfy at least **four out of the following six** requirements:
(i) the approach angle shall be at least 25 degrees;
(ii) the departure angle shall be at least 25 degrees;
(iii) the ramp angle shall be at least 25 degrees;
(iv) the ground clearance under the front axle shall be at least 250 mm;
(v) the ground clearance between axles shall be at least 300 mm
(vi) the ground clearance under the rear axle shall be at least 250 mm.

Architecture, design, performances

G category

- Low FUP beam implies short front overhang
- Consequences
  - On architecture: “cab-over-engine” versus “conventional vehicles”
  - On design: components to be re-located
  - On performances: examples for active safety sensors, emissions components, AC components and more



R =▶ 500 mm, Tyre’s radius (may vary from ~400 mm to ~700 mm)
H =▶ 400 mm, UN R93 maximum height
α =▶ 25°, R.E.3 minimum category-G vehicle approach angle
OH =▶ 858 mm, Calculated maximum overhang
OH = H / tan α

Cab over engine truck

Conventional truck

Cascade of regulatory consequences

G category

- **Losing the category G status implies**
  - Review of the compliance to specific regulations
  - Example of other regulations and designs areas impacted:

Regulated texts
UN R51 – Sound emissions
UN R13 – Brakes
EU 2017/2400 – CO_2 emission declaration
UN R48 – Lights
UN R61 – External Projections
Spray suppressions
Other and new regulations such Noise/CO_2/Direct vision/VRU/Euro 7/…
National legislations for off-road vehicles
…

Design regulated impacts
Increase of masses and dimensions
CO2 increase and pay load lost
Towing device
Cab access and steps
Emissions, performances
Redimensioning of the driveline
Sensors for vision, driving help …
Other sensors technology…
…

Additional standards / specifications

G category

- **Losing the G-category will impact the non-UN requirements to fulfil:**

  Examples of additional off-road standards/specifications

  - ISO 11228-1
    Ergonomics to move a FUP estimated at 75 kg on 2,2 meters

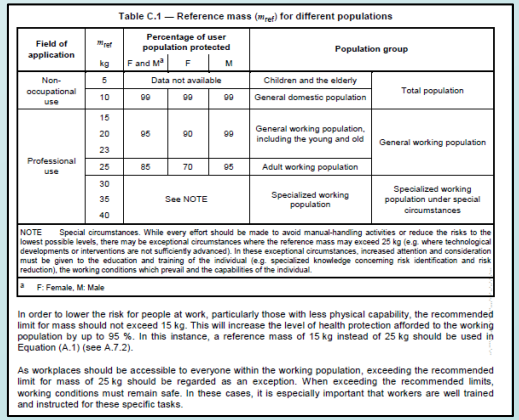


Table C.1 — Reference mass (m_{ref}) for different populations

Field of application	m_{ref} kg	Percentage of user population protected F and M[a]	F	M	Population group	
Non-occupational use	5	Data not available			Children and the elderly	Total population
	10	99	99	99	General domestic population	
Professional use	15 20 23	95	90	99	General working population, including the young and old	General working population
	25	85	70	95	Adult working population	
	30 35 40	See NOTE			Specialized working population	Specialized working population under special circumstances

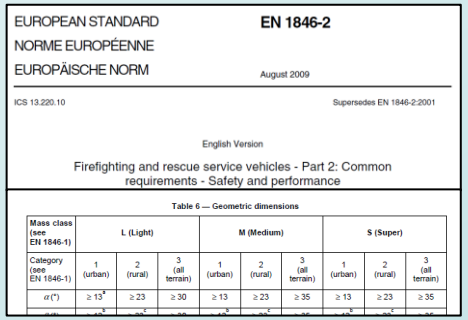
NOTE Special circumstances. While every effort should be made to avoid manual-handling activities or reduce the risks to the lowest possible levels, there may be exceptional circumstances where the reference mass may exceed 25 kg (e.g. where technological developments or interventions are not sufficiently advanced). In these exceptional circumstances, increased attention and consideration must be given to the education and training of the individual (e.g. specialized knowledge concerning risk identification and risk reduction), the working conditions which prevail and the capabilities of the individual.

[a] F: Female, M: Male

In order to lower the risk for people at work, particularly those with less physical capability, the recommended limit for mass should not exceed 15 kg. This will increase the level of health protection afforded to the working population by up to 95 %. In this instance, a reference mass of 15 kg instead of 25 kg should be used in Equation (A.1) (see A.7.2).

As workplaces should be accessible to everyone within the working population, exceeding the recommended limit for mass of 25 kg should be regarded as an exception. When exceeding the recommended limits, working conditions must remain safe. In these cases, it is especially important that workers are well trained and instructed for these specific tasks.

  - Specific approach angle requirements in fire brigade EN 1846 standard,



EUROPEAN STANDARD **EN 1846-2**
NORME EUROPÉENNE
EUROPÄISCHE NORM
August 2009

ICS 13.220.10 Supersedes EN 1846-2:2001

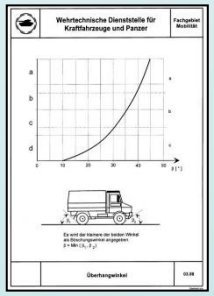
English Version

Firefighting and rescue service vehicles - Part 2: Common requirements - Safety and performance

Table 6 — Geometric dimensions

Mass class (see EN 1846-1)	L (Light)			M (Medium)			S (Super)		
Category (see EN 1846-1)	1 (urban)	2 (rural)	3 (all terrain)	1 (urban)	2 (rural)	3 (all terrain)	1 (urban)	2 (rural)	3 (all terrain)
α (°)	≥ 13[a]	≥ 23	≥ 30	≥ 13	≥ 23	≥ 35	≥ 13	≥ 23	≥ 35

  - Mobility classification of federal armed forces.



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Technical domino

Machinery on wheels

- Securing a FUP requires consequent re-design of a number of parts and functions (regulated and not regulated) in a very much packed front-low bumper volume:

  - Off-road application vehicles are in rough working environments.
  - Rough vehicle operation create damages and FUP integrity may be impacted.
  - Technical challenge in making FUP compatible with protection plates underneath the vehicle, plates needed to protect vital parts.
  - If electrically operable or moveable FUP, will need additional space.
  - Impact on the masses and dimensions

Technical domino

Machinery on wheels

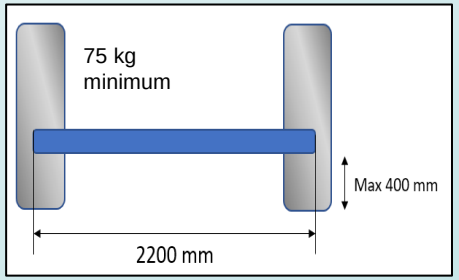
- A moveable FUP (currently not existing) would require specific protections to guarantee its function integrity:

  - Dirt environment damages to the mechanism in case of a moveable FUP.
  - Protection of deployment mechanisms
  - A foldable or partly foldable FUP could make the vehicle longer
  - Impact on the masses and dimensions and packaging

Technical domino

Machinery on wheels

- A moveable FUP could make the vehicle longer and will increase the front axle load:

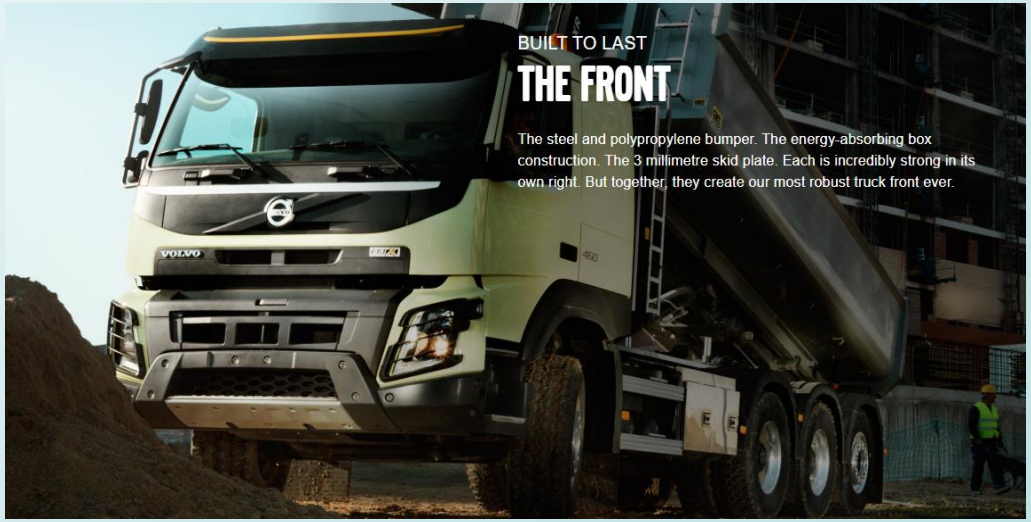


  - Impacts on the Mass & Dimensions of the vehicle.
  - Economic operation impact :
    - Operator to mount and dismount the FUP when leaving/entering the working areas,
    - Implying dedicated operators with specific tools and locations at both entrance and exit of construction sites,
    - Additional check to be performed to secure FUP function integrity
    - May be double operations because of ergonomic working requirements,
    - Time and cost impacts for end users.

Technical domino

Machinery on wheels

- A FUP on a category G vehicles may have to withstand forces higher than those of UN R93 test forces to secure the daily operation



Examples

Machinery on wheels

- Examples of **applications where the equipment is overtaking the FUP-function**

  These vehicles trucks are not designed with a UN R93 compliant FUP.

Examples

Machinery on wheels

- **Examples** of non-AWD and AWD vehicles, specific application vehicles, construction equipment

  Implementing a FUP on these vehicles will impact the application by reducing the approach angle to values such as ± 15°.

Conclusion

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Conclusions

- **Active safety systems prevent**/avoid the accident.
- The definition of **G category is a tool to discriminate** the vehicles at the time a regulation is applied. This tool must continue to exist in UN R93
  - For avoiding consequent redesigns impacts to fulfil all necessary regulations, standards and design requirements
  - For avoiding non-negligible cost and time impacts
  - For avoiding important end-customer application costs and productivity constraints
  - For avoiding fragmentation of the UN markets between national and regional off-road legislations
- G vehicles are "**machinery on wheels**":
  - Small fleet, low mileage
  - No accidentology background
  - Front end (under the bumper) much equipped and sophisticated

Conclusions

OICA recommends:

- Keeping the scope of UN R93 unchanged.

- Introducing the elongated cab configuration
  - » Support ECE/TRANS/WP.29/2020/83