DIRECT VISION
N3G – Industry Proposals

VRU-PROXI

ACEA WORKING GROUP TRUCK SAFETY

18 November, 2020

VRU-Proxi-16-07
A division of the direct vision requirement between vehicles that are more likely to run in cities (Level A) and vehicles that very seldomly or never enter a city (Level B) is proposed

- Different thresholds should apply for the different vehicle groups
- Proposal based on a few basic vehicle characteristics and leverage on a similar division done in the EU CO2 Regulations

- N3G vehicles are handled in this proposal
WHAT IS N3G – HEAVY OFF-ROAD TRUCK?

• An off-road vehicle is per definition one that qualifies into (sub)category G according to Annex I of Regulation (EU) 2018/858 and paragraph 2.8 of UN ECE Consolidated Resolution on the Construction of Vehicles (R.E.3)
  • Underlying need is to ensure off-road driving capacities and obstacle avoidance

• N3G vehicles – off-road classified heavy trucks – are exempted from, or have less strict requirements in, a number of regulations
  • E.g. FUP (R93), RUP (R58), Noise (R51), Brakes (R13), Lights (R48), External Projections (R61)
  • Underlying reason is that the needs for off-road driving capacities and obstacle avoidance hinder some equipment to be mounted and makes some functions inappropriate
  • When derived from an N3, many of those requirements are still fulfilled by the N3G vehicle

• **N.B.** A construction vehicle is not per definition an off-road vehicle – most tipper and mixer trucks sold do not qualify into the N3G definition
N3G ≠ CONSTRUCTION VEHICLE

• A construction vehicle is not per definition an off-road vehicle – most tipper and mixer trucks sold do not qualify into the N3G definition

N3 construction vehicle
N.B. relatively low chassis/cab height

N3G construction vehicle
N.B. relatively high chassis/cab height

Machinery on wheels:
Small fleet and low mileage
<table>
<thead>
<tr>
<th>Category</th>
<th>Axles driven simultaneously (power may be disengaged)</th>
<th>Differential lock (or similar)</th>
<th>Ability to climb a x% gradient (solo vehicle)</th>
<th>Approach angle</th>
<th>Departure angle</th>
<th>Ramp angle</th>
<th>Ground clearance</th>
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<td></td>
<td></td>
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<td>under front axle</td>
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<tr>
<td>M1 N1</td>
<td>Front ≥ 1 Rear ≥ 1</td>
<td>≥ 1</td>
<td>25%</td>
<td>≥ 25°</td>
<td>≥ 20°</td>
<td>≥ 20°</td>
<td>≥ 180 mm</td>
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<td><strong>OK if at least 5 of these 6 geometrical conditions are met</strong></td>
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<tr>
<td>M2 N2 M3≤12t or</td>
<td>All axles</td>
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<td>Front ≥ 1 Rear ≥ 1</td>
<td>≥ 1</td>
<td>25%</td>
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<td><strong>≤ 7.5t OK if at least 5 of these 6 geometrical conditions are met</strong></td>
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<td><strong>&gt; 7.5t OK if at least 4 of these 6 geometrical conditions are met</strong></td>
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<tr>
<td>N3 M3&gt;12t or</td>
<td>All axles</td>
<td>No condition</td>
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<td>No condition</td>
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<td>Half of axles, or 2/3 for 3 axles configuration</td>
<td>≥ 1</td>
<td>25%</td>
<td>≥ 25°</td>
<td>≥ 25°</td>
<td>≥ 25°</td>
<td>≥ 250 mm</td>
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<td><strong>OK if at least 4 of these 6 geometrical conditions are met</strong></td>
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</table>
N3G – NOT POSSIBLE TO “PHASE OUT”

• N3G operation in relevant operations and locations, *non exhaustive*
  • Forestry in Scandinavia and South Africa
  • Open pit mining in Australia and Malaysia
  • Underground mining in South Africa and Sweden
  • Reclaiming land from the sea in the Netherlands
  • Road construction in Siberia during flooding in the spring
  • Defence operation all over the world
  • Construction sites all over the world
  • *City construction and waste handling to a low extent, in particular UK*
Achieving a high direct vision performance, according to the volumetric method, requires the chassis/cab height to be low, since direct vision performance is built up from a combination of:

1. Chassis/cab height (driver’s position height)
2. Cab design specificities (i-panel, doors, windows, driver’s longitudinal position...)

...in which parameter 1, chassis/cab height, has the predominant influence

- the higher chassis/cab height, the lower the direct vision performance

Parameter 1 is a customer choice based on their operational needs

Parameter 2 can be influenced by the OEM by considerable redesigns of the cab and/or additional medium-heavy development work
• The most predominantly influencing parameter (1) is the sum of
  a) Chassis height, i.e. size of axle drop, height of suspension and wheel size
  b) Cab floor height over the chassis
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  a) Chassis height, i.e. size of axle drop, height of suspension and wheel size
  b) Cab floor height over the chassis

• For long haulage, the highest chassis heights (a) are rarely needed, while the highest cab floor heights (b) are both needed and desirable

• For off-road trucks (N3G), the highest cabs (b) are rarely needed, while high chassis heights (a) including large wheels are operational prerequisites
  • Exemptions among N3G are AWD-trucks and a small portion of non-AWD
Given the different basic needs between (non-AWD) N3G and long haulage vehicles, the following analysis apply:

- For long haulage applications with flat floor cabs and normal-high chassis, the highest cab floor heights are at approximately X mm *
- For non-AWD N3G applications with normal high cabs, with their higher chassis, the highest cab floor heights are found at approximately X-100 mm **
- A difference of ~100 mm in cab floor height at this level indicates a difference in direct vision volume of approximately 1 m³, provided everything else is kept constant

This is valid in general, but differs slightly between manufacturers and designs and “the tail” of specifications may require further consideration.

* N.B. vehicles not limited to 4,00 m total height can have higher total floor height
** N.B. higher cabs are also used in N3G to some content; “the tail”
LONG HAUL VERSUS N3G – GENERAL RULE

N3G (left) has higher chassis height than Long haul tractors (right)

The higher cabs that are normally used in Long haul however most often result in a higher total cab floor height, as indicated above.
The following three proposals are possible:

1. Introduce a third level B+ group, with a limit value $1\,m^3$ above level B group threshold for non-AWD N3G vehicles, AWD vehicles in level B group
   - Technology neutral: same cab improvements as long haulage (Level B group) guaranteed

2. N3G vehicles qualified through the attack angle ($\geq 25^\circ$) – level B group
   - Provide clarity but is not future proof due to potential FUP requirement

3. N3G vehicles qualified through front ground clearance ($\geq 250\,\text{mm}$) – level B group
   - Provide clarity and is future proof to FUP requirement