Transmitted by the experts from OICA

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Comments supplementing document ECE/TRANS/WP.29/GRSG/2009/21 Regulation No. 34 (Fire risks)

The text reproduced below was prepared by the expert from the International Organization of Motor Vehicle Manufacturers (OICA) in order to provide justifications to the exemption of diesel tanks from mandatory charge dissipation system.

Justification

Background
Paragraph 5.11. of Regulation N°34 was last amended in 2004 (document ECE/TRANS/WP.29/GRSG/2003/7) at the eighty-fourth session of the Working Party on General Safety Provisions (GRSG). The purpose of this amendment was to take into account the potential danger for gasoline fuel propelled vehicles from sparks initiated by electrostatic charges.

The adopted amendment was as followed :

Paragraph 5.11., amend to read:

"5.11. **The fuel tank and its accessory parts** ~~the filler neck~~ shall be designed and installed in the vehicle in such a way ~~as to avoid any accumulation of static electricity charges on their entire Surface~~ **that any ignition hazard due to static electricity shall be avoided.** If necessary, ~~they shall be discharged into the metallic structure of the chassis or any major metallic mass by means of a good conductor~~ **measure(s) for charge dissipation shall be provided. The manufacturer shall demonstrate to the technical service the measure(s) which guarantee the fulfilling of these requirements."**

The wording included the expression "if necessary" in order to allow the approval authorities to request appropriate technical measures, depending on their assessment of the danger. As a matter of fact, experience and statistical data to date showed no danger for diesel fuel vehicles, and no fire due to the electrostatic charging in diesel fuel tanks was ever reported. This situation is of course still true today because diesel fuel has a high Minimum Ignition Energy (spark point) which makes it safer than gasoline. The original amendments was indeed primarily addressing gasoline tanks.

Unfortunately, it appears that there is a variety of interpretations among Approval Authorities regarding this provision. Some Authorities require the vehicle manufacturers to fit an electrical link between the tank and the chassis, even in the case of diesel fuel, whereas others consider there is no danger in such case and consequently do not require charge dissipation measure.

This is the reason why OICA proposes to clarify that tanks for diesel fuel are not targeted by paragraph 5.11.

Technical parameters

To provoke an ignition of the gas mixture at the top of the filling pipe, three phenomena must be cumulated:

1. A **spark**, generated by sufficient induced energy and **electrostatic charge** above ca. 30kV/cm
2. Diesel vapors and air mixed in a rate in the vicinity of the **stoechiometric** conditions
3. **Temperature** of the vapors higher than 55°C (flash point of diesel fuel 10 ppm in Europe, see standard EN590_2002).

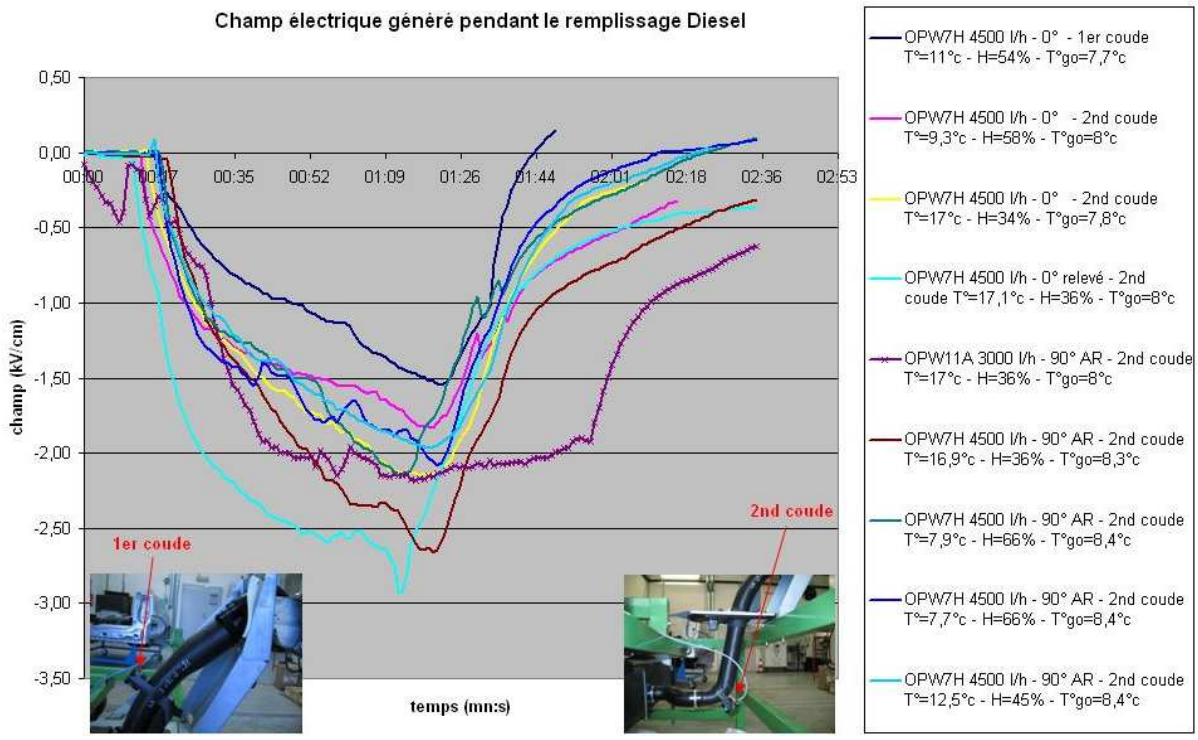
Two sources of danger are to be taken into account during the filling:

A. Electrostatic charges generated by the circulation of the fluid in the gun of the filling station: while the level can reach the critical 30kV/cm, the flash point temperature of 55°C is almost never reached at the level of the pipe head, and the stoechiometric conditions are never cumulated to the electric charge and the temperature.

B. Electrostatic charges generated by the friction of the fuel inside the pipe of the tank: the studies carried out to date (see below) show that this level reaches ca. 3 kV/cm, much lower than the threshold necessary to generate a spark (30kV/cm). In the case of heavy vehicles, the charge generated by the fluid circulation inside the tank pipe is dramatically reduced because the nozzle is directly fitted on the reservoir (no pipe).

Tests have been carried out with various flows of diesel fuel inside the pipe: 3000 l/h (maximum flow for light vehicles) and 4500 l/h (usual flow for heavy vehicles). The electrostatic charge was measured at the head of the filing pipe ("1er coude") and at the inlet of the tank ("2nd coude"). The maximum electrostatic charge obtained is 3 kV/cm (10 times lower than the electrostatic load necessary to create a spark – see above).

Test : Electric field measured during the filling of the diesel



None of the conditions of inflammability stated above (1, 2 and 3) are reached by the sources of danger stipulated in A and B.

Conclusion

The above demonstration provides evidence that no charge dissipation measure is to be required for vehicles using a fuel with a flash point higher than 55°C (diesel fuel).

Additional information
Lowest flash point values in other countries are :

Country	Minimum permitted diesel flash point (°C)	Signatory to 58 Agreement	Signatory to UNECE R34
India	35	No	-
South Korea	40	Yes	No
Canada	40	No	-
USA	38 (for N°1 Diesel only)	No	-
Japan	45	Yes	No

Petroleum company data sheet
EC provided to GRSG at its 97th session information concerning the flash point of the Diesel fuel and the cautions necessary when handling the fuel. The representative from the European Commission referred to a safety data sheet for diesel fuel edited by TOTAL as "Data sheet: FDS N° 30226-33 version 4.04 of 21.07.2006".

This data sheet states that:

(a) in its item 7 – manipulation and storage – any static charge accumulation during manipulation must be avoided.

(b) Similarly, static charge accumulation and possible inflammation source during storage must be avoided.

While the above recommendations primarily address manipulation and storage in a static tank, the representative from EC wondered why the vehicle reservoirs should be differently treated.

(c) He also added that the flashpoint can lower with the use of additive components added to the diesel fuel during winter.

OICA recognizes that a fuel used to propel a vehicle by means of an internal combustion engine presents some risks of explosion, as it is precisely the desired characteristic.

- However, the demonstration provided above shows that the situation cited in (a) is never reached in real world conditions. In addition, the same data sheet stipulates in its item 10 – stability and reactivity – that the product is stable at the storage, manipulation and usage temperatures.
- The condition (b) is even less likely because the generation of static charge comes from the circulation of the fluid, but does not appear when the fluid remains in its reservoir.
- The conditions of item (c) above could not be found in the data sheet.

It is the purpose of a security data sheet to enumerate all theoretical risks. However those risks are not quantified and it makes it difficult to assess the level of danger when taking the security sheet as a basis. As an example, the sheet mentioned by the European Commission also refers Diesel fuel as a carcinogen of Category 3 and recommends to bear appropriate protections and clothes when manipulating the fuel.