

## New Realities In Mobility Require Future Proof Emission Standards

PlasEnSys and EuPC position paper on  
Permeability Factor and Refueling Emissions in Euro VII/7

*PlasEnSys, as sector group of EuPC, the European Plastics Converters Association, puts forwards a proposal for the elimination of the determination of the permeability factor in consideration of the obsolescence of the monolayer fuel tanks with fluorination or sulfonation. An adjustment of the “assigned permeability factor” for lower emission target through the replication in Euro VII/7 of the China VI “deterioration correction” should also be considered a viable alternative.*

*Additionally, PlasEnSys and EuPC support the Euro VII/7 proposal in regards to the alignment of refueling test procedure based on China VI Regulation.*

### A) Permeability Factor and Assigned Permeability Factor

On a global scale, none of the legislations on emissions currently in force uses determination of “permeability factors” as a measure of emission loss deterioration from fuel systems. Similarly, none of the legislations currently in force uses an “assigned permeability factor” (i.e., USA CARB LEV III, EPA Tier 3, Brazil Proconve L7/L8, China VI).<sup>1</sup>

In terms of ongoing discussions, only for Euro VI/6 and for the proposal of Euro VII/7 the assigned permeability factor is being taken into consideration as a measure of deterioration from permeation loss of fuel tanks.

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<sup>1</sup> CARB Low-Emission Vehicle (LEV) III regulations: <https://ww2.arb.ca.gov/our-work/programs/low-emission-vehicle-program>  
EPA Tier 3 standards: <https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-control-air-pollution-motor-vehicles-tier-3>

Brazil Proconve L-7 And L-8 Emission Standards for Light-Duty Vehicles: <https://www.transportpolicy.net/standard/brazil-light-duty-emissions/>

China’s Stage VI Emissions Standard: <https://theicct.org/publication/chinas-stage-vi-emissions-standard-for-heavy-duty-vehicles-final-rule/>

Under EU6D the determination of permeability factor was introduced to address reported lifetime compliance issues with evaporative emission limits for vehicles with fuel tanks made of single-layer High Density Polyethylene (HDPE) with fluorination.

The determination of the permeability factor (hereinafter PF) for the fuel system (5.2.1 to 5.2.7) as set out in the current version of EU6D shall be applied authoritatively if the manufacturer uses a monolayer fuel tank according to the definition, which may also be equipped with fluorination or sulfonation. Instead of determining the PF (according to 5.2.1 to 5.2.7), the manufacturer may alternatively apply the assigned permeability factor (5.2.8, hereinafter APF) if a multilayer tank has been installed. According to the definition, a multilayer tank is a fuel tank consisting of at least two different layers, one of which is impermeable to hydrocarbons, including ethanol.

With the introduction of bio-ethanol in fuels across Europe through the renewable energy directive combined with the EU6D requirement of maximum 2g/test evaporative parking emissions as the sum of the 2 days diurnal testing, monolayer HDPE fuel tanks with barrier coatings such as fluorination or sulfonation have already become an extinct technology.

Presently, on a global scale only metal tanks, multilayer tanks with barrier against hydrocarbon and ethanol as well as special monolayer tanks made of engineering plastics like Polyamide 6 (PA6) have become state-of-the-art technology for low-emission legislations like EU6D, those above mentioned<sup>2</sup> and EU7.

Specifically, in regards to the latter, no changes are foreseen in comparison to EU6D as 0,120g/test for assigned permeability factor. However, it should be taken into consideration that the EU7 vehicle target will be reduced from 2g/test as a sum of a 2-day test to 0.5g/test as worst of a 2-days test.

All the other legislations define a kind of “deterioration correction” as a measure to ensure compliance with vehicle limits considering the durability of vehicles with combustion engines.

Against this background, PlasEnSys and EuPC propose to eliminate the determination of permeability factor since the rationale for monolayer fuel tanks with fluorination or sulfonation does not exist in the market anymore. Alternatively, PlasEnSys and EuPC propose to adjust the “assigned permeability factor” for lower emission target, suggesting as a potential solution the replication in Euro 7 of the “deterioration correction” encompassed within the China VI legislation as to be 0,06g/test.

## Technical specifications

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<sup>2</sup> See ¶ nr. 1

EU VII/7 should consider the deterioration correction values of Type IV (EVAP diurnal) according to Table 8 of 5.3.5.1.2.2 as part of GB 18352.6-2016 as replacement of the current 120mg/day “assigned permeability factor” (APF) for monolayer tanks made of engineering plastics – (density above 1g/cm<sup>3</sup>), metal- and multilayer fuel tanks and deterioration for refueling.

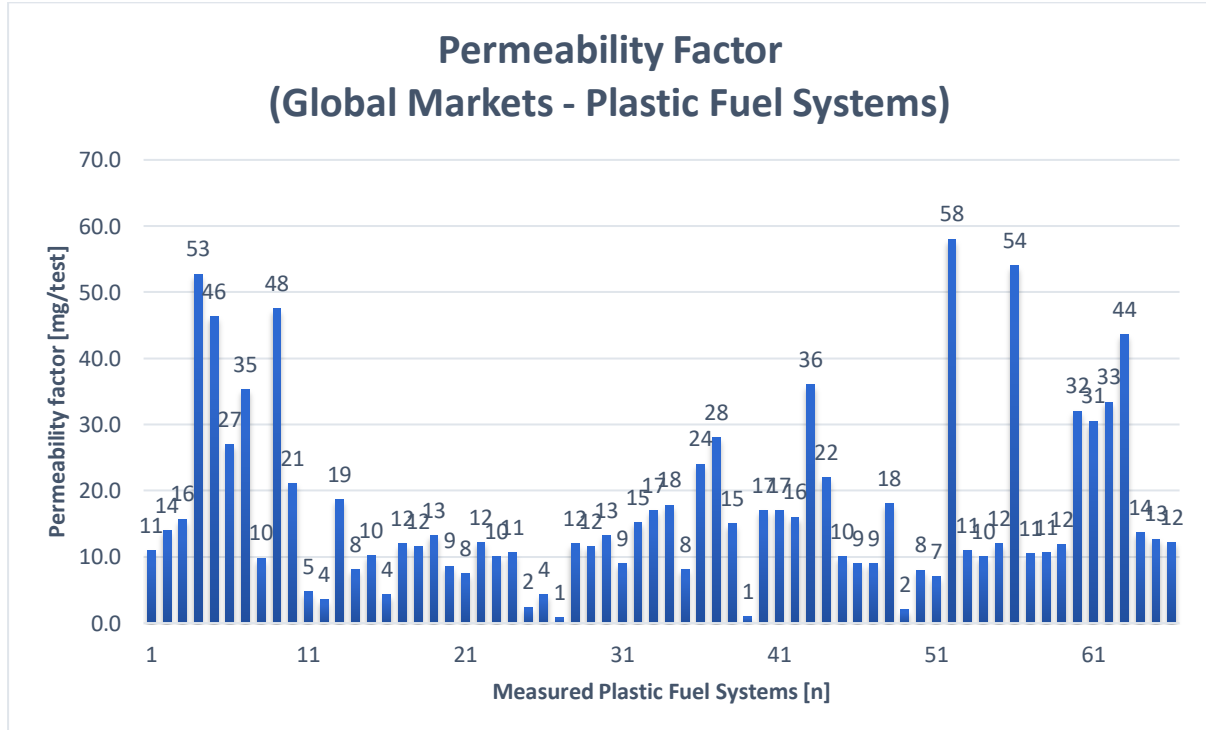
5.3.5.1.2.2 Manufacturer is also allowed to use the deterioration correction values of Type IV and Type VII tests specified in Table 8.

**Table 8 Deterioration correction values of Type IV and Type VII tests**

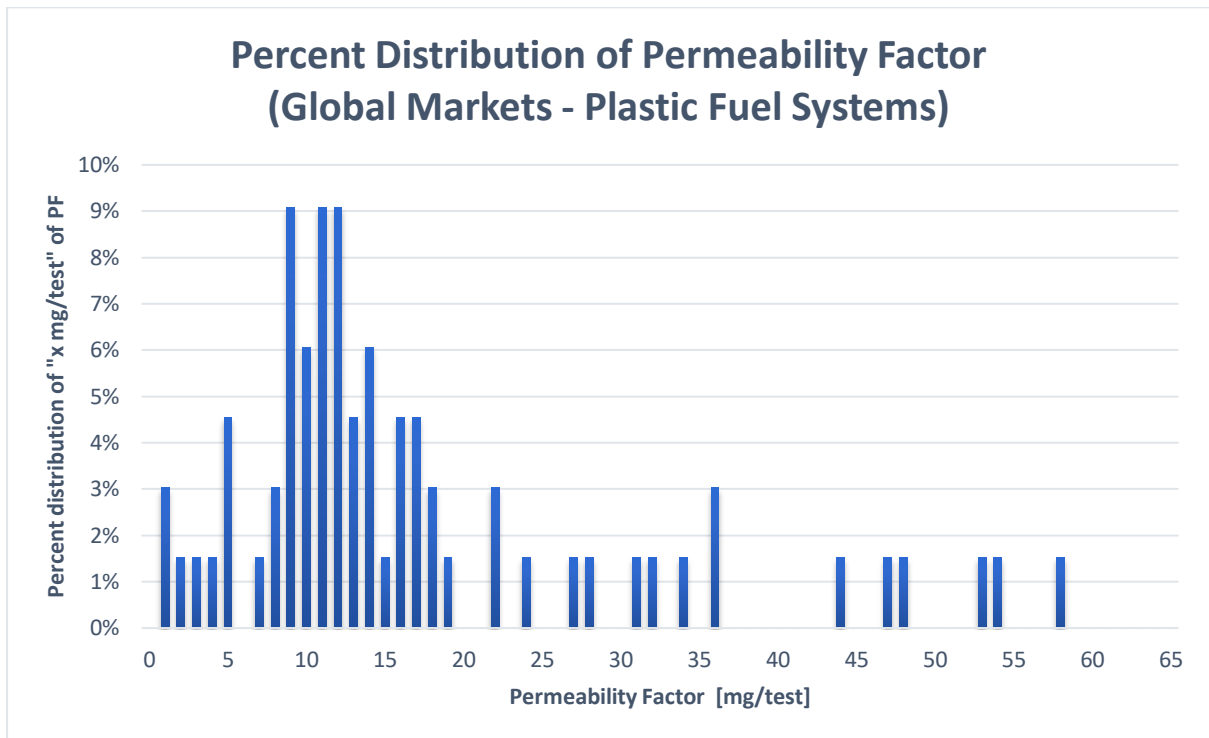
Category	Deterioration correction values
Type IV test (Hot soak + diurnal breath emission)	0.06g/test
Type VII test (Refueling emission)	0.01g/L

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The following figure illustrates the determination results from more than 50 “permeability factors” of today's fuel systems made for different international markets - determined according to EU6D. The graph clearly shows that the current value of assigned permeability factor of 120mg/d is much too high and a maximum of 60mg is justified.



<sup>3</sup> Table from China VI, GB 18352.6-2016



#### B) Refueling Emissions

Euro 7 proposal states alignment of refueling test procedure based on China VI regulation. PlasEnSys, in the capacity of sector group of the EU-level trade association European Plastics Converters, is fully supporting this proposal.

Specifically, in regards the definition of the fill nozzle, the proposal shall define more precisely the usage of a kind of “standard fill nozzle” without Stage II function to conduct the refueling test in the SHED and not only meeting the ISO 9158 standards for a nozzle.

As an example, in China or USA , refueling emissions tests are commonly performed with OPW 11A fill nozzle.