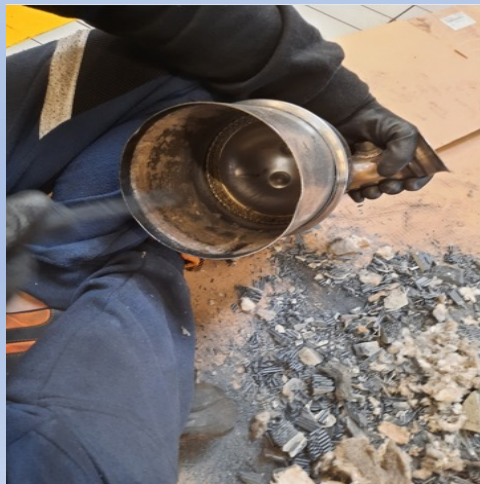


# NPTI diesel market penetration

An update on the roll out of Particle Number (PN) emission testing as part of PTI/ MOT in Europe.



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# Questions

1. Why are European countries implementing stricter PTI/MOT diesel emission testing with the support of the EU Commission?
2. Which countries have introduced Particle Number (PN) metric as part of PTI/MOT emission testing and what are the main differences between national product type approvals, test procedures, conformity assessment and market surveillance?
3. Is there a blueprint for other countries to follow and how can this process be supported?
4. What can we learn from our experiences so far?

## **Scope**

The presentation will cover the four countries that have adopted the new PTI/MOT test with supporting data on how such an intervention is improving air quality and our climate.

What are the main differences in implementation and what can we learn from our experience so far to assist the roll out in other countries

# Commission Recommendation of 20.3.2023

## WHY

In regard to EU's **Article 292** and the unanimous adoption of recommendations from the Commission and in the interests of **public health, environmental protection and fair competition**, it is important to ensure vehicle in use **emission compliance**, so that they can maintain their performance as guaranteed by type-approval, without excessive degradation, throughout their lifetime.

The **test methods** required by Directive 2014/45/EU of the European Parliament and of the Council<sup>1</sup> as regards exhaust emissions of diesel motor vehicles, based on **opacity/ smoke meters are no longer fit for purpose** in checking the effectiveness of particulate filters. This means **light-duty diesel** vehicles first registered as of **1. January 2013 (Euro 5b and newer)** and **heavy-duty diesel** vehicles first registered as of **1 January 2014 (Euro VI and newer)**.

The guidelines should include **requirements** related to the **measuring equipment, metrological controls, the measurement procedure, metrological and technical requirements, as well as a pass/fail limit**.

This Recommendation is a first step towards harmonised PN measurement during roadworthiness testing within the Union,

## THE EUROPEAN COMMISSION HAS ADOPTED THIS RECOMMENDATION:

Member States should apply particle number measurement during the periodic technical inspection of vehicles equipped with compression ignition engines and diesel particulate filters in accordance with the guidelines set out in the Annex.

# **Particle number measurement for the periodic technical inspection of vehicles equipped with compression ignition engines. What to look out for?**

**Scope** – PN/ PTI/ Vehicles

**Metrological Requirements** – Referenced or not; Counting Efficiencies; Linearity; Response time; Volatile Particle Removal, Environmental, Durability, Repeatability, Endurance,

**Technical Requirements** – Construction; Performance integrity including Software Guide for MID (Welmec 7.2)

**Metrological Controls**- Product Type Approval; Initial and subsequent verification

**Measurement Procedure** – Guidelines to vehicle PN test protocol

**Limits** – Pass/ Fail



# Market observations and issues

## Manipulating test results

- Adding additional filters inside the exhaust pipe or even adding a DPF on the end of the exhaust pipe temporarily.
- Saturating the exhaust system with water.
- Engine Mapping to further dilute combustion.
- Measuring ambient air instead of inserting the probe in the tailpipe.

## Product and Market Issues

- Variances between PNCs when engine is below operating temperature.
- Variances beyond MPE between PNCs.
- Variances in calibration results between using a Field Calibration system based on Salt and Soot.
- Zeroing during high background PN concentrations and certain environmental conditions.
- ISO17020 duties and responsibilities for retest when adjustments are required during yearly verification.
- Perception of PN Test as a regulatory way of reducing diesel vehicle fleet due to high costs of repairs and typically short-term fixes.
- Availability of replacement filters in the automotive aftermarket, especially Euro 6.
- Limited awareness of how to repair DPF related problems in the trade. Poorly fitted filters and filters never replaced.
- Quality between OE and aftermarket DPFs.
- Effects of periodic high exhaust temperatures on PN measurement and PNC construction.

# First results from Germany



TÜV Verband reported in January 2024;  
940,809 diesel vehicles Euro 6/VI were officially  
PN tested from August 1<sup>st</sup> to 30<sup>th</sup> October 2023  
and 32,285 (**3.43 %**) failed. Vehicles with 50 to  
160k km = 3.3 %, up to 50k = 2.8%, more than  
160k km = 4.7%.

EOBD/ OBDII only detected 0.72% failures.





**First Results-BE:1-jul-2022 to 1-May-2023; NL: 1-Jan-2023 to 1-May-2023**

	<b>The Netherlands</b>	<b>Belgium (Flanders)</b>
M1, N1 – Euro 5	n.a.	12,41 %
M1, N1 – Euro 6	n.a.	2,81 %
M1, N1 – Total	5,78%	7,77 %
N2, N3 - Total	0,28%	-

<b>Mileage</b>	<b>Rejected</b>
0 – 50.000	1,58%
50.001 – 100.000	4,48%
100.001 – 150.000	8,05%
150.001 – 200.000	11,81%
+200.000	14,81%

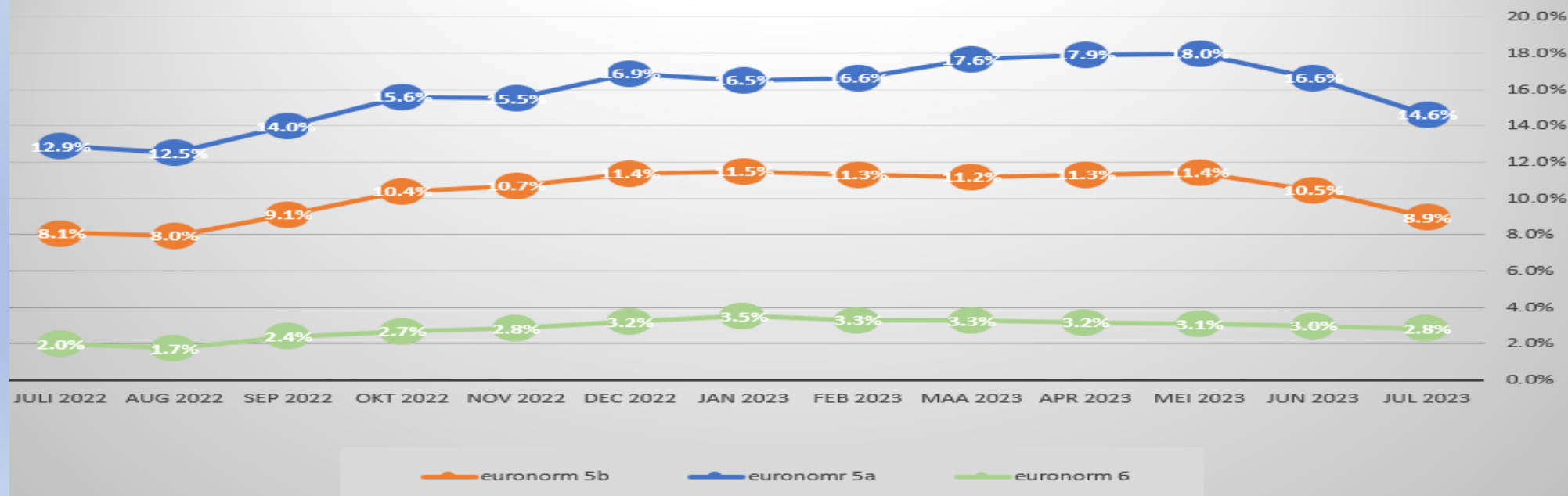
- 2,17% of the 5,78% in the Netherlands has chosen to deregister the DPF. (DET before 1-1-2017)
- If the threshold would be 250.000 cm-3 in Belgium, 9,87% would be rejected

# NL PTI/PN Data

## Deeltjestellertest - Opvolging Afkeurpercentages

GLOBAAL	Aantal gecontroleerd	AFKEUR		OPMERKING	
		Aantal afgekeurd	%	Aantal met opmerking	%
Euro 5a	217,910	34,588	15.9%	11,967	5.5%
Euro 5b	317,247	32,861	10.4%	12,120	3.8%
Euro 6	346,719	14,709	4.2%	10,188	2.9%
<b>Totaal</b>	<b>881,876</b>	<b>82,158</b>	<b>9.3%</b>	<b>34,275</b>	<b>3.9%</b>

AFKEURPERCENTAGE (+1.000.000 cm<sup>-3</sup>)

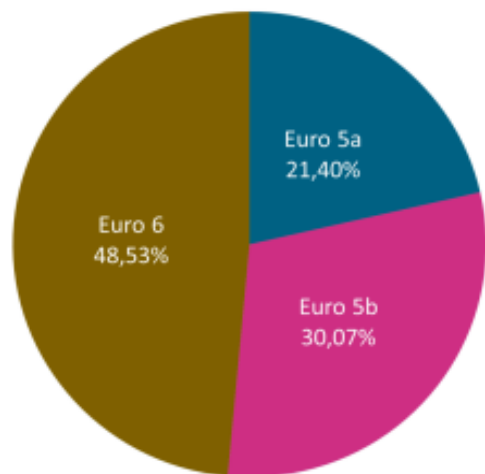


# Sample of Flanders, 554,760 tested vehicles


## Scope

	Flanders & Brussels	Wallonia
Vehicle category	M1, N1	M1, N1
Fuel type	Diesel	Diesel
Euro Norm	Euro 5a and higher	Euro 5b and higher
Threshold [cm <sup>-3</sup> ]	(250.000) – 1.000.000	(250.000) – 1.000.000

Distribution sample PN measurements in Flanders July - January 2023 according Euro-norm (554.760 vehicles)



## RESULTS threshold is 1.000.000 m<sup>-3</sup> → 7,38 % was rejected

Euro	2018	2022
Euro 5	11,20%	11,86%
Euro 5a	13,68%	14,76%
Euro 5b	6,79%	9,80%
Euro 6	1,89%	2,62%
	0,29%	0,20%

# A Dutch Experience testing 356 passenger cars and 230 LDV

Table 2: Classes PTI-PN measurement values of 586 Dutch vehicles

Particle emission (#/cm <sup>3</sup> )	Number of vehicles	Share [%]	Comment
0 – 5.000	330	56,3	Super clean
5.000 – 250.000	131	22,4	Small defective DPF
250.000 – 1.000.000	36	6,1	Medium defective DPF
> 1.000.000	89	15,2	Very defective or removed DPF
<b>Total</b>	<b>586</b>	<b>100,0</b>	

The results show that particulate filter technology of a large proportion of (especially older) diesel vehicles is not sufficiently sustainable because the particulate emissions are (much) too high. Age and mileage have a major impact on the MOT rejection rate.

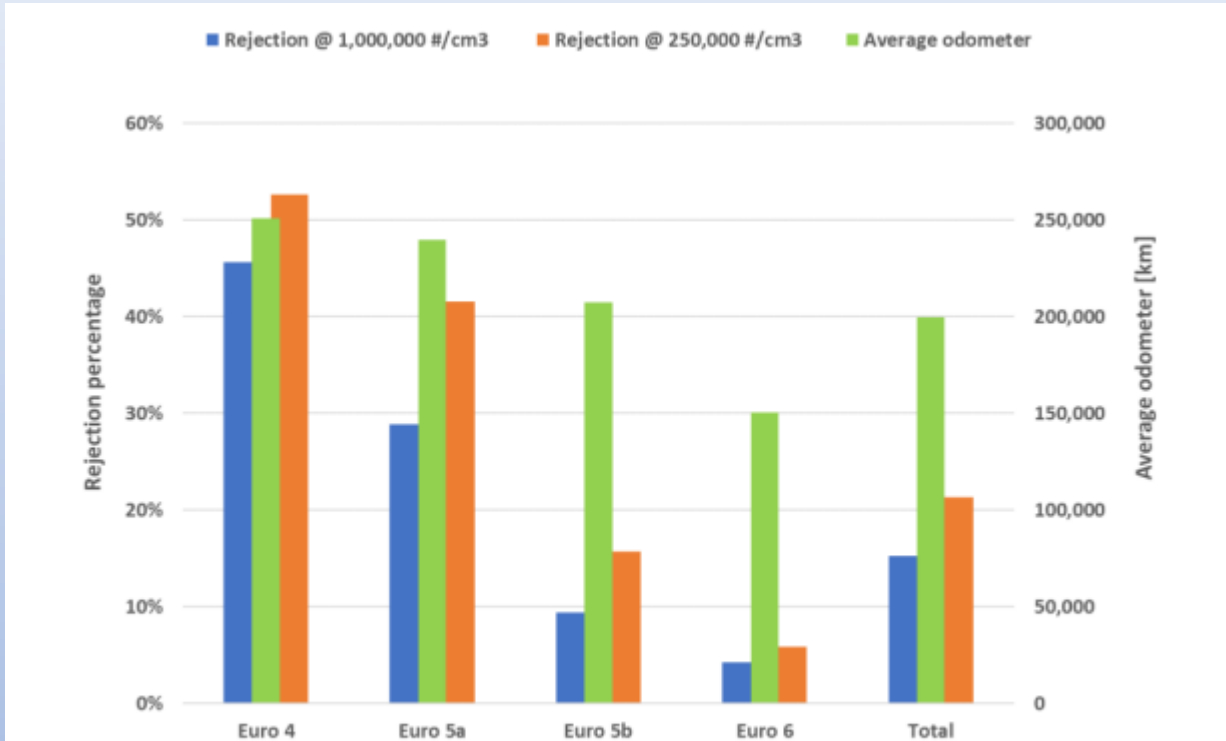


Figure 5: PTI rejection percentages per Euro class at two PN limit values.

Early indications from Switzerland is an approximate 10% failure rate (BAFU 3/3/23)

# CURRENT PRESS

- SOME CONFUSION
- ISSUES IN THE MARKET
- AVAILABILITY OF REPLACEMENT PARTS
- WHICH COUNTRY IS NEXT FOR PTI/PN?
- PN TESTING FOR GASOLINE VEHICLES?
- NOx?

> ACTU > VOUS > TÉMOIGNAGES

## Suite aux nouvelles règles du contrôle technique, des véhicules Ford ne passent plus: "On ne nous propose aucune solution!"

Louis Vandriessche, publié le 01 décembre 2022 à 06h00



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**N**ieuwsblad  
NIEUWS SPORT REGIO SLIMMER LEVEN BILLIE PODCAST  
MEEST RECENT RED JE GELD BINNENLAND BUITENLAND TV-GIDS PUZZELS MEER...

### Ford van Vicky vier keer afgekeurd door nieuwe roetfiltertest: "1.400 euro extra kosten"

ECONOMIE

## Contrôle technique : pourquoi ça coince au niveau du filtre à particules ?



De Ford Fiesta van Vicky Dolmans uit As werd op nog geen twee weken tijd vier keer afgekeurd omdat de wagen te

# Wijs-Air

- Founded on May 17<sup>th</sup>, 2020
- Active member of the NPTI working Groups, VERT Association, GEA & SMMT in the UK, ASA in Germany and EGEA in Brussels. Chair of the Air Monitoring Working Group at the Westminster Commission for Road Air Quality. Board member of the VERT Association.
- Activities are consultative for companies and organisations working towards cleaner and safer air, promoting technologies and instruments that measure poor, toxic and “sick” air and the efficacy of filtration and purification to help the process.
- Despite increasing electrification, clean combustion must remain a key target for energy, transportation and industry. With focus on mitigating emissions, public health and climate, we must use best available and fit for purpose technologies to measure, monitor and check emission compliance for in-service vehicles and machinery.

## **Acknowledgements**

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- Gerrit Kadijk – Author of Particles Matter - [www.particlesmatter.com](http://www.particlesmatter.com)
- Van Abeelen APK & ETS