Ministry for Infrastructure and Public Works

ADMINISTRATIVE AND LEGAL AFFAIRS DEPARTMENT

Regulation of the Minister for Environment and Housing of November 21, 2019, No. IENW / BSK-2019/202498, amending the Vehicle Regulations to enable the control of diesel particulate filters with a particle counter and a number of other technical changes

The Minister for Environment and Housing,

Having regard to Articles 71 and 71a of the Road Traffic Act 1994 [Wegenverkeerswet 1994];

HEREBY DECREES THE FOLLOWING:

Article I
The Vehicles order shall be amended as follows:

A
Article 5.2.11 is amended as follows:
1. In row 9, after the phrase 'the value indicated for this in the vehicle register is less than or equal to 0.005 g/km', the following is inserted: 'or the environment classification indicated on the registration certificate is greater than or equal to Euro 6'.
2. In row 10, after the phrase 'in the vehicle register', the following is inserted: 'or on the registration certificate'.
3. After row 11, a row is added, reading:

12. For passenger vehicles with particulate filters as referred to in rows 9 and 10, the particulate filter must work properly. The provisions of Annex VIII, Articles 45e to 45f, shall apply here.	The general periodic inspection (PTI) shall not check for this requirement in order to issue an inspection report.

B
Article 5.3.11 is amended as follows:
1. In row 9, after the phrase 'the value indicated for this in the vehicle register is less than or equal to 0.005 g/km', the following is inserted: 'or the environment classification indicated on the registration certificate is greater than or equal to Euro 6'.
2. In row 10, after the phrase 'in the vehicle register', the following is inserted: 'or on the registration certificate'.

3. After row 11, a row is added, reading:

12. For commercial vehicles with particulate filters as referred to in the rows 9 and 10, the particulate filter must work properly. The provisions of Annex VIII, Articles 45e to 45g, shall apply here.	The general periodic inspection (PTI) shall not check for this requirement in order to issue an inspection report.

C
Article 5.3.a11 is amended as follows:
1. In row 9, after the phrase 'in the vehicle register', the following is inserted: 'or on the registration certificate'.
2. After row 10, a row is added, reading:

11. For buses with particulate filters as referred to in row 9, the particulate filter must work properly. The provisions of Annex VIII, Articles 45e to 45g, shall apply here.	The general periodic inspection (PTI) shall not check for this requirement in order to issue an inspection report.

F
Article 8.1.5

1. The measurement equipment referred to in Article 8.1.3 *(such as a PN counter, item j)* shall undergo periodic re-inspection after commissioning. A re-inspection certificate shall be issued as proof of the re-inspection.
2. To obtain the re-inspection certificate referred, it is necessary to meet the general and special requirements set out in Parts 3 and 4, respectively, for the relevant measurement device.

H
Article 8.1.9

1. The period of validity of an inspection certificate shall be 12 months for measurement equipment as referred to in Article 8.1.3(1)(a, b, c, i, j, k and l) (j = PN counter);

W

§ 9. Particle counters

§ 9.1. General

Article 8.4.77

Number
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In this Section, the following terms and definitions shall apply:

automatic control facility: a control facility that works without user intervention;

automatic adjustment facility: a facility that adjusts the instrument according to the programme, without the user having any influence over the startup or amount of the adjustment;

control facility: a facility built into an instrument that enables detection of and response to significant errors. Here, 'response to' means any clear response by the instrument, such as a warning lamp, acoustic signal or aborting the measurement;

particle: a solid particle with a mobility diameter of between 23 and 200 nm;

particle counter: a measurement device to determine the number of particles by volume (concentration);

(electrical) mobility diameter: the diameter of a particle if measured in an electric field (particle size);

filter: a facility that removes certain components from the exhaust gas sample;

gas treatment system: all parts of the instrument, from the probe to the outlet of the gas samples, through which the exhaust gas sample is pumped;

HEPA filter: a facility that removes particles from the air (HEPA stands for High-Efficiency Particulate Air);

internal adjustment facility: a facility to adjust the instrument to a set value without using a reference PN sample;

adjustment facility with reference PN sample: a facility to adjust the instrument to the value of a reference PN sample;

zeroing facility: a facility to set the instrument readout to zero;

warmup time: the amount of time between when the instrument is powered up and when the instrument can meet the metrological requirements;

PN sample: a gas mixture consisting of particles of specific mobility diameters;

reference PN sample: a gas mixture of adequate stability and known composition;

reference conditions: operating conditions specified for studying the performance of an instrument, or for comparison of measurement results;

response time: the interval between when the instrument is subject to a predefined sudden change in the composition of a PN sample and when the indication within predefined limits corresponds to the ultimate stable value;

semi-automatic adjustment facility: a facility that enables the user to start adjusting the instrument without the ability to influence the amount of the adjustment, regardless of whether the adjustment is required automatically. For instruments into which the reference PN sample values must be fed manually, this facility is considered to be semi-automatic;

probe: a part of the gas treatment system slid into the tailpipe of a vehicle to take gas samples.

Article 8.4.78
In addition to the information referred to in Article 8.3.6(2), the manual for the particle counter shall also contain:
a. the time intervals and procedures for adjustment and the maintenance instructions to ensure continuous compliance with the requirements on maximum errors;
b. a description of the procedure for the leak test;
c. the maximum and minimum storage temperature;
d. a description of the operating conditions;
e. if applicable, the specifications for the battery.

Article 8.4.79
In addition to the inscriptions referred to in Article 8.3.5(1), the particle counter shall bear an inscription of the minimum and nominal flow rates.

§ 9.2. Metrological requirements on particle counters

Article 8.4.80
The number of particles by volume shall be expressed as the number of particles per cm3 for particles of specified dimensions, such as '#/cm3'.

Article 8.4.81
The readout unit shall be no more than 1 000 particles/cm3.

Article 8.4.82
The minimum measurement range, which may be subdivided, shall be 5 000 to 5 000 000 particles/cm3. If the measurement range is exceeded, the instrument shall indicate this (visually).

Article 8.4.83

Error type	Maximum error * [particles/cm3]
Absolute	25 000
Relative	± 25 % of the actual value
* Absolute or relative, whichever is greater	

Article 8.4.84
1. The maximum errors, referred to in Article 8.4.83, shall not be exceeded under the following conditions, for a particle size of 80 nm +/- 5 %, unless indicated otherwise:

a. the operating conditions referred to in Article 8.3.4(4);
b. relative humidity: up to 95 % RH;
c. atmospheric pressure: (860 – 1 060) hPa.

2. The detection efficiency by particle size shall be:

Detection efficiency	Particle size
20 – 60 %	23 nm +/- 5 %
60 – 130 %	50 nm +/- 5 %
70 – 130 %	80 nm +/- 5 %

3. The following disturbances shall not have an effect greater than the absolute maximum error, or the instrument shall automatically detect and indicate them:
   a. the effects referred to in Article 8.3.9;
   b. mechanical impacts caused by a free fall of 50 mm for instruments secured in place and of 1 m for handheld instruments, onto any vertex of a solid surface;
   c. vibrations of 10 to 150 Hz, 1.6 ms^{-2}, 0.05 m^2s^{-3}, -3 dB/octave.

4. When measuring a particle concentration by testing with reference PN samples, an instrument, including corresponding gas treatment system, shall indicate 95 % of the ultimate value within 15 seconds after a change in ambient air (response time). The instrument may be fitted with a logging facility to verify compliance with this requirement.

5. After the warmup time, the instrument shall meet the metrological requirements according to this provision. The instrument shall prevent indication of the particle concentration during the warmup time.

6. In cases of normal use of the instrument, the measurement results – after adjustment with a reference PN sample or internal adjustment facility – shall not exceed the maximum errors for at least 12 hours, without the user applying a reference PN sample or internal adjustment during this time. If the instrument is fitted with a method for drift compensation, such as automatic zeroing or automatic internal adjustment, the functioning of this adjustment shall not cause any indication that could result in confusion with a measurement of an external particle concentration.

7. If the same person conducts 20 consecutive measurements on the same reference PN sample with the same instrument within a relatively short period of time, the standard deviation of these 20 results shall not exceed one third of the absolute value of the maximum error.

§ 9.3. Technical requirements

§ 9.3.1. Construction

Article 8.4.85

1. All components of the gas treatment system shall be made from materials resistant to corrosion; in particular, the probe material must be resistant to

exhaust gas temperatures. The materials used shall not affect the composition of the gas sample.

2. The probe shall be designed so it can be inserted at least 30 cm into the vehicle tailpipe and held in place with a fastener, regardless of the insertion depth.

3. The instrument shall contain:
   a. a facility to prevent water condensing in the gas treatment system and measurement components; or
   b. a facility that gives an alarm and prevents indication of a measurement result.

4. If a reference PN sample is required due to the measurement principle, the instrument shall feature a simple facility to provide a sample.

5. The pump used to extract the gas:
   a. shall be installed so its vibrations do not affect the measurements;
   b. shall be capable of being switched on/off independently of the other parts of the instrument. However, it shall not be possible to take a measurement with the pump switched off.

6. The instrument shall contain a facility that indicates when the gas flow falls to a level that would cause:
   a. a failure to meet the response time; or
   b. an effect on the indication that is greater than half the absolute value of the maximum error.

   This facility shall prevent measurements being taken when one of these limits is reached.

7. The gas treatment system shall be adequately airtight so the effect of dilution with ambient air on the measurement result does not exceed half the absolute value of the maximum error.
   When a leak occurs that causes a value in excess of one of these limits, no measurements shall be taken.
   The manual shall describe a clean air test procedure of sufficient accuracy (such as a HEPA filter with 99.97 % efficiency) to detect this leak.

8. The instrument shall contain a facility that performs an automatic zeroing or zeroing procedure every day at least on initial use. This facility may be combined with the clean air test procedure in paragraph 7.

9. The instrument shall have a logging frequency greater than or equal to 1 Hz.

10. The total logging time shall be at least 15 seconds and may be subdivided into periods.

Article 8.4.86

1. The instrument shall be designed according to proper professional practice to ensure that particle concentration reduction factors are stable during a vehicle test.

2. The instrument shall have a removal effectiveness of over 95 per cent for 30 nm Tetracontane ($C_{40}H_{82}$) particles at a concentration of 5 000 to 10 000 per cm^3.

§ 9.3.2. Measurement programme

Article 8.4.86a

1. The software of the particle counter must automatically guide the device operator through the measurement procedure referred to in paragraphs 2 and 3.

2. Before the start of a measurement, the following data shall be entered:
   a. vehicle registration number;
   b. limit for vehicle.

3. After the probe has been inserted into the tailpipe, the following steps are followed for the soot filter test:
   a. stabilize a period of 15 seconds with the engine running at idle speed;
   b. during the logging time, measure and then present the measurement value based on the average over the logging time;
   c. if the measurement value is less than or equal to the limit: indicate that the test was passed;
   d. if the measurement value is greater than the limit: indicate that the test was not passed.

4. If, after the probe has been inserted into the tailpipe, the measured value immediately increases to more than twice the limit value, the measurement procedure may be interrupted and the test has not been passed.

§ 9.3.3. Safety devices

Article 8.4.87

1. If detection of disturbances as referred to in Article 8.4.84(3) is handled with automatic control facilities, it shall be possible to verify their proper functioning.

2. The instrument shall be fitted with an automatic control facility that verifies the correct value or status (that is within the limits) for all internal adjustments, reference PN sample adjustment and all other control facility parameters before the measurement can be indicated or displayed.

§ 9.4. Adjustments

Article 8.4.88

1. If the instrument is fitted with user-accessible adjustment, it shall be adjusted using a semi-automatic adjustment facility.

2. If an instrument fitted with an automatic or semi-automatic adjustment facility is in need of adjustment, it shall not be possible to take a measurement until after completion of the proper adjustments.

3. Both an automatic and a semi-automatic adjustment facility are permitted to issue a signal when an adjustment is required.

AB
In Annex VIII corresponding to Chapter 5, a new § 4 is added to Title 3 'Engine and fuel systems', reading:

§ 4. Particles

Article 45e. Particulate filter functioning test
1. Proper functioning of the particulate filter is checked by measuring the number of particles per cubic centimetre in the exhaust gases.
2. The test referred to in paragraph 1 is conducted with an idle engine.

Article 45f. Number of particles with an idle engine
Exhaust gases from passenger cars, commercial vehicles and buses with a combustion engine with compression ignition and particulate filter shall contain no more than the following particle values with an idle engine:
a. 1 000 000 particles per cubic centimetre if the vehicle was commissioned before 1 January 2015;
b. 250 000 particles per cubic centimetre if the vehicle was commissioned after 31 December 2014.

Article 45g. Method of inspection
1. The inspection referred to in Article 45e shall be conducted by measurement on a stationary passenger car, commercial vehicle or bus with a particle counter that has been powered on for at least the warmup time indicated by the particle counter manufacturer.
2. Each test shall check that the sampling system is in good condition, including checking the sampling hose and probe for damage.
3. The probe shall be inserted at least 0.30 m into the outlet of the exhaust system.
4. If the exhaust system has more than one outlet, the test shall be limited to just one outlet.

Article II

This Order shall come into force on 1 January 2020.

This Order shall be published in the Government Gazette with its explanatory memorandum.

THE MINISTER FOR ENVIRONMENT AND HOUSING,

S. van Veldhoven - Van der Meer

Ministry for Infrastructure and Public Works

EXPLANATORY NOTES

Number
IENW/BSK-2019/*

General

1. Introduction

This amendment to the Vehicles order [Regeling voertuigen] is intended to set down a measurement procedure for effective verification of the functioning of particulate filters in diesel vehicles with a particle counter. This verification is conducted by measuring the number of soot particles in the tailpipe of a diesel vehicle with an idle engine. Starting on 20 May 2018, diesel vehicles with a factory-installed particulate filter shall undergo a visual inspection to ensure that the filter is present and not obviously defective. In addition, this Order also enables verification of the functioning of particulate filters with a particle counter. This makes this test available to inspection stations of the Netherlands Vehicle Authority [RDW] and for police roadside inspections.

As explained in the letter[1] of 20 February 2019 to the lower house of the Dutch Parliament, this legislation also provides a basis for introducing the particulate filter check with particle counters as a mandatory part of the Periodic Technical Inspection [PTI]. To do this, by new follow-up regulations the stipulation in the Vehicles order must be removed that 'proper functioning of the particulate filter shall not be tested during the general periodic inspection (PTI) in order to issue an inspection report'. The aspirational date for this amendment, which is simple to implement in terms of legislation, is 2021. Earlier is not possible because particle counters specially developed for the PTI must be made available on the market first. In addition, this Order also implements several other technical amendments.

2. Outline

Particulate filter inspection

The introduction of a particulate filter test is part of the Action Plan on particulate filter inspection. As stated in the letter[2] of 12 July 2017 to the lower house of the Dutch Parliament, implementation of this plan is already in full swing. On 20 May 2018, a visual check on particulate filters was introduced into the PTI. In addition to this, recent years have seen work to develop a test with a particle counter, for better detection of removed or defective particulate filters. As an initial step, this test will be available at inspection stations of the RDW. Next, the police will have the authority to conduct roadside checks on particulate filters with a particle counter. Finally, the particle counter test will be introduced for particulate filter inspection in the PTI. Given the necessary preparation time for the RDW and the automotive sector, 2021 has been set as the aspirational date.

The option to conduct a particle counter test for the particulate filter inspection implements the motion of members Hoogland and Van Tongeren of 29 October 2015[3]. This motion of the lower house of the Dutch Parliament asked the government to proceed as quickly as possible with the introduction of an effective test on the emission of harmful substances in the PTI. The considerations cited in this motion included the fact that currently in the

[1] Parliamentary Papers II 2018/9, 30 175, No 328
[2] Parliamentary Papers II 2017/8, 31 209, No 217
[3] Parliamentary Papers II 2015/16, 34300-XII No 29

Netherlands some 100 000 vehicles are circulating without a particulate filter or other environmental protection system, that vehicles without particulate filters or other environmental protection systems emit up to 30 times more harmful substances than vehicles with a particulate filter, and that individuals with a vehicle with the particulate filter or other environmental protection system removed are seldom if ever caught during the PTI.

Air pollution is a major contributor to illness and death. Exposure to particulate matter alone is responsible for around 4 % of the burden of disease in the Netherlands. Thus, after smoking (13 %), air pollution is one of the biggest risk factors, on the same order of magnitude as obesity (5 %) and physical inactivity (3-4 %). The air has become somewhat cleaner, but considerable health benefits remain to be achieved. On 23 January 2019, the Health Council issued an opinion on the health benefits of cleaner air. This opinion recommended prioritising reduction of concentrations of particulate matter and nitrogen dioxide originating from road traffic, especially diesel vehicles. The portion of defective and removed particulate filters in diesel passenger cars subject to the PTI and with a particulate filter installed by the manufacturer is estimated at 8 to 10 %.

Particulate filter test with particle counter
As noted in the letter[4] of 6 July 2015 to the lower house of the Dutch Parliament, the Netherlands Organisation for Applied Scientific Research [TNO] has been conducting research into metrological options for a particulate filter test since 2013, under assignment from the Ministry for Infrastructure and the Environment (currently the Ministry for Infrastructure and Public Works). This study found that the functioning of particulate filters can be properly verified by measuring the number of soot particles in the tailpipe of a diesel vehicle. A particle counter offers excellent distinguishing capabilities. A properly functioning particulate filter can trap practically all particulate matter. The number of particles drops from approx. 5 000 000 per cubic centimetre directly from the engine to less than 5 000 per cubic centimetre after the filter. At values of over 250 000 particles per cubic centimetre, the particulate filter is defective or has been removed. The measurement with a particle counter is conducted with an idle engine. The sampling hose of the particle counter is held in the tailpipe of the vehicle for a short period of time. This makes particulate filter testing quick and easy to perform with a particle counter.

Over the past few years, an international New Periodic Technical Inspection (NPTI) working group developed the method for measuring the number of particles in the tailpipe of a vehicle. The Dutch contingent in this group included the Netherlands Vehicle Authority RDW, the Netherlands Metrology Institute [NMi], the research organisation TNO and the Ministry for Infrastructure and Public Works. In addition to the Netherlands, the NPTI working group included representatives from Switzerland, Germany, Belgium, the European Commission and various particle counter manufacturers. Switzerland[5] made a key contribution because they already have particulate filter inspection in place for mobile tunnel construction machinery. The NPTI working group drafted a document with technical specifications for a particle counter for direct use in the tailpipe of a vehicle. Moreover, this working group discussed the exact method for conducting

[4] Parliamentary Papers II 2014/5, 30 175, No 220
[5] The Swiss organisation VERT, promoting best available technologies for emission testing

the particle measurement and the standard value for the number of particles per cubic centimetre in order to pass the test.

Sections of the regulations for the particle counter test
The Vehicles order is amended for the following three points:

1. Chapter 5. Permanent requirements.
   Introduction of a new permanent requirement that the particulate filter of a diesel vehicle must function properly. Parts A, B and C of this amending Order.
2. Chapter 8. Measuring equipment.
   Specification of the new measuring equipment for counting the number of particles in the exhaust gas of a vehicle and describing the method for conducting the particle counter test. Part W of this amending Order.
3. Annex VIII. Additional permanent requirements and user requirements.
   Definition of the procedure for verification of proper functioning of the particulate filter based on the number of particles and the testing method. Part AB of this amending Order.

Below, a general explanation is first provided on these three sections.

The other sections pertain to other technical changes. The explanatory notes by article cover the various amendments in further detail.

Re 1. New permanent requirement on the proper functioning of the particulate filter
The new permanent requirement related to proper functioning of the particulate filter is tested by measuring the number of particles in the exhaust gas. Diesel vehicles without particulate filters emit around
5 000 000 particles per cubic centimetre with an idle engine. The standard value for proper functioning is 1 000 000 particles per cubic centimetre for vehicles manufactured up to and including 2014, and
250 000 particles per cubic centimetre for vehicles manufactured in or after 2015. The standard value of 1 000 000 particles per cubic centimetre for vehicles up to and including 2014 generally corresponds to approx. 20 % of particles passing through. The standard value of 250 000 particles per cubic centimetre for vehicles starting from 2015 means that approx. 5 % of the particles pass through.

The requirement for 250 000 particles per cubic centimetre with an idle engine links up with the European type approval and sustainability standard for the number of particles from passenger cars and delivery vans starting from Euro class 5b and for trucks and buses starting from Euro class VI. Studies by TNO[6] and the European Commission[7] show that the requirement for
250 000 particles per cubic centimetre is three to five times less stringent than the Euro 5b standard for particulate emissions of
600 000 000 000 particles per kilometre.

The date of 1 January 2015 for the standard of
250 000 particles per cubic centimetre was derived from the start date of

[6] TNO 2017 R10530 | 1.0
[7] GIECHASKIEL, B., LAHDE, T., SUAREZ-BERTOA, R. et al. Particulate number measurements in the European legislation and future JRC activities. Combustion Engines. 2018, 174(3), 3-16. DOI: 10.19206/CE-2018-301

1 January 2013 for the Euro 5b particle count standard for passenger cars and delivery vans. Starting on 1 January 2013, it was permitted to place what is known as the 'remaining stock' of Euro 5b vehicles onto the market for two more years. In light of this period, the standard of
250 000 particles per cubic centimetre applies to all vehicles first registered on or after 1 January 2015. To keep administrative procedures simple, the limit of 250 000 particles per cubic centimetre also applies to Euro VI trucks and buses since 1 January 2015. For vehicles from before 1 January 2015, the standard of 1 000 000 particles per cubic centimetre applies.

Re 2. New measuring equipment for counting particles
This amendment to the Vehicles order defines a particle counter for direct use in the tailpipe of a stationary vehicle with idle engine. Particle counters are already available as handheld instruments for measuring the quality of ambient air. In addition, particle counters are used to take measurements in the laboratory on roller beds and engine test benches according to the PMP method, and for measurement of emissions on the road with a mobile measurement system according to the PN-PEMS method for Real Driving Emissions (RDE). The new instrument for direct use in the tailpipe measures the number of non-volatile particles with a size of approx. 55 nanometres in a measurement range of up to 5 000 000 particles per cubic centimetre. The new measuring equipment must be suitable for measurement conditions such as those in the workplace of an automotive company or during roadside inspections.

In 2018, NMi adopted an English-language version of the specifications drafted by the international working group for the new measuring instrument for Periodic Technical Inspection (NPTI working group). To draft this amending Order, the technical specifications from the English document were translated into Dutch and added in a new '§ 9 Particle counters', under Part 4 of Chapter 8 of the Vehicles order. The new § 9 replaces the old '§ 9 Exhaust gas analysers with lambda measurement', which is now removed because this measuring equipment is now covered by direct reference to European legislation.

NMi-approved particle counters must be used for particulate filter testing. In 2019, NMi will establish a procedure for certification of PTI particle counters according to the requirements set out by means of this amending Order. This procedure contains the type approval and the initial inspection and periodic inspection of particle counters for stationary vehicles with idle engines. NMi is expected to be ready to issue national type approval certificates before the end of 2019.

According to expectations, NMi may certify the first 'PTI particle counters' in early 2020. Various manufacturers report that they are working on developing prototype particle counters for use in the workplace at automotive companies. If these manufacturers complete the NMi certification procedure, the particle counters specially developed for vehicles may be placed onto the market as NMi-approved instruments for testing particulate filters in the Netherlands.

By virtue of Article 8.1.2 of the Vehicles order, particle counters are also permitted if approved by an independent inspection body in another country based on requirements meeting at least the same level as the national requirements. One example of a measuring instrument of this kind would be

Nanoparticle Emission Tester (NPET) Model 3795 by manufacturer TSI. This measuring instrument, developed to test particulate filters in tunnel construction machinery, was approved by Swiss institute METAS according to Swiss Regulation SR 941.242 (2014) for Non-Road Mobile Machinery. The measurement procedure of this instrument meets the requirements of this Order. Particulate filter tests at RDW inspection stations and during roadside inspections may therefore in the first instance be conducted with the TSI NPET.

Re 3. Measurement procedure for particle counter test
The particulate filter test is conducted using the particle counter to measure the number of soot particles over a minimum logging time of 15 seconds, after a 15-second period with the engine running at idle to stabilise the measurement signal. If the average measurement value over the logging time is less than the standard value of 1 000 000 particles per cubic centimetre for vehicles up to and including 2014, and 250 000 particles per cubic centimetre for vehicles starting from 2015, the vehicle passes the test. If, after the probe is introduced into the outlet, the measured value immediately increases to more than twice the limit value, the measurement procedure may be interrupted and the test has not been passed. The test using the particle counter may be conducted in all engine conditions. A properly functioning particulate filter is highly effective at trapping particulate matter. Particle emissions from a diesel vehicle with a properly functioning filter do not exceed approx. 5 000 particles per cubic centimetre. This ensures compliance with the standard values of the test by a wide margin.

3. Regulatory pressure effects for companies and administrative burdens for RDW

For this amending Order, an assessment was conducted on the impact on the regulatory burden effects for companies and regulatory burdens for the RDW from the introduction of the new particle counter test. The basic principle here is that vehicle maintenance costs are part of normal automotive costs. Maintenance on a particulate filter may consist in mandatory external cleaning or replacement of the particulate filter. If a particulate filter is removed to save on maintenance costs, this will be considered improper maintenance resulting in damage to the vehicle. In such cases, the owner of the vehicle must incur additional costs to bring the vehicle into a proper state of repair.

This change in the Vehicles order makes it possible to conduct particulate filter checks during roadside inspections. This involves checking diesel vehicles with a factory-installed filter for particulate matter emissions that are significantly higher than expected from a properly functioning filter. Vehicles with excessive particulate matter emissions will initially receive a warning to have filter maintenance performed or, for older vehicles, to register the filter as removed in the vehicle register, by submitting a notification. A formal record may be drawn up at a later time.

Particulate filter checks on the road will link up with the existing police roadside inspections. The measurements on the soot filter during roadside checks are carried out by the RDW in the role of technical support from the police. In cases of major inspections, RDW staff already take part in these. Linking up with the existing inspections minimises the supervisory burden. The following principles were applied in estimating the costs. Roadside inspections will use a particle

counter to measure the particulate matter emissions of approx. 1 000 diesel vehicles with a factory-installed particulate filter. The RDW already has TSI NPET particle counters, for direct measurement in the exhaust gases of a diesel vehicle. The exact setup for roadside inspections still needs to be worked out.

The time needed to conduct the particulate filter test with a particle counter is around 60 seconds. Including waiting time for the motorist, the total time per test is assumed to be 15 minutes. It is further assumed that two thirds of the kilometres driven with diesel vehicles with particulate filters are for business and one third are for personal purposes. At an hourly rate of EUR 37.00 for medium-skilled personnel and EUR 15.00 for private individuals, the supervisory burden for citizens and businesses from the roadside inspections comes to EUR 7 417.00 per year. For the execution costs of roadside inspections for the government, we assume 10 additional days for an RDW employee. At a daily rate of EUR 1 000.00 per person, this comes to a total EUR 10 000.00.

This Order was submitted to the Advisory Board on Regulatory Burden [ATR] on 16 May 2019 with a request to review the planned provisions. ATR shares the analysis that the proposal is not expected to result in significant regulatory burdens and has therefore not issued a formal opinion on the proposal.

4. Consultation and advice

Pursuant to Article 11 of the Road Traffic Service Control and Supervision Order [Regeling sturing van en toezicht op de Dienst Wegverkeer], the draft of this amending Order was submitted to the RDW for a feasibility assessment. Just as with TNO and NMi, the RDW was highly involved in the drafting of this amending Order.

The RDW was asked to conduct a feasibility assessment on supporting the police during roadside inspections by conducting tests with a particle counter to inspect particulate filters. The results of this feasibility assessment were presented on 28 August 2019 to the Ministry of Infrastructure and Watermanagement. The RDW already has the METAS-certified Nanoparticle Emission Tester (NPET) Model 3795 by manufacturer TSI. By virtue of Article 8.1.2 of the Vehicles order, this instrument is permitted for use in conducting formal particulate filter inspections with a particle counter. The RDW can use the TSI NPET as a first step for a limited number of roadside checks.

The TSI NPET particle counter is not suitable for conducting soot filter checks on roadside checks on a structural basis. Particulate counters should be used for this, which are easier to carry and with power from a battery instead of power from the mains. This concerns particle counters approved by NMi that have been developed for the PTI. It looks like these PTI particle counters will become available on the market in the first or second quarter of 2020. For the structural performance of soot filter inspections during roadside inspections by the RDW, RDW employees must be trained who are authorized to perform inspections.

The draft of this amending Order was provided to the PTI Advisory Body [AB-PTI]. This consultation at the AB-PTI included all parties directly involved in the PTI: the Royal Dutch Touring Club [ANWB], the Dutch Bicycle and Automobile Industry Association [RAI-Vereniging], the Dutch Association of Automobile Dealers and

Garage Owners [BOVAG], Transport and Logistics Netherlands [TLN], PTI garages, etc. Based on feedback from AB-PTI, an additional amendment was applied so the particulate filter test during roadside inspections can also be conducted on foreign trucks.

By virtue of the Road Traffic Act 1994 [Wegenverkeerswet 1994], NMi has been designated as the inspection body for PTI measuring equipment. This inspection includes the type test and the initial and periodic inspections of measuring equipment used for the PTI. Under assignment from the Ministry for Infrastructure and Public Works, NMi will set up a process for inspection of PTI particle counters. These activities are carried out in close consultation with TNO, foreign institutes, suppliers, RDW and other stakeholders.

Because this amending Order entails changes in the rights and obligations of citizens, businesses and institutions, an online consultation was held. In the period from July to August, this Order was published for feedback. A total of six responses from six individual applicants were received. The responses related on the one hand to the introduction of the soot filter test as a compulsory part of the Periodic Technical Inspection (PTI) and on the other hand to the regulations for the introduction of the particle counter test itself. The reactions regarding the introduction of the filter test for the PTI contain valuable comments that will be taken into account in the follow-up regulations that are required for this.

5. Notification

The draft of this amending Order was submitted to the European Commission on 8 July 2019 in implementation of the provisions of Article 5(1) of Directive (EU) 2015/1535 of the European Parliament and of the Council of 9 September 2015 laying down a procedure for the provision of information in the field of technical regulations and of rules on Information Society services (OJ L 241, 2015; notification number 2017/0351/NL). Pursuant to Article 6(1) of the aforementioned Directive, a standstill period of three months was subsequently observed, which ended on 9 October 2019. No responses were received during this period.

6. Entry into force

The Order shall enter into force on 1 January 2020. The date of entry into force can be shortly after the publication date because this legislation does not have any extensive impact on enforcement.

Explanatory notes by article

Article I

A
Amendment of rows 9 and 10 of Article 5.2.11 enables inspection of foreign vehicle with particulate filters as well. This is because the Dutch vehicle register does not indicate whether foreign vehicles are fitted with a factory-installed particulate filter. This amendment allows this information to be obtained from the vehicle registration certificate. Euro 6/VI is applied as the criterion for this

because both Euro 6 vehicles with approvals under the light-duty regime as well as Euro VI vehicles with approvals under the heavy-duty regime are fitted with factory-installed particulate filters. This insertion makes foreign vehicles passing through the Netherlands subject to the same environmental requirements as Dutch trucks, to avoid unfair competition.

A new permanent requirement is added as row 12 to Article 5.2.11, stating that for diesel passenger cars with a factory-installed particulate filter, the particulate filter must work properly. Proper functioning is checked based on the number of particles per cubic centimetre in the exhaust gases. Articles 45e to 45g of Annex VIII specify the method to be used for this measurement and the standard values applicable to the measurement. Diesel passenger cars with a factory-installed particulate filter are defined based on the particle emissions determined during the European type approval. Passenger cars approved under the light-duty regime with an emission test on a roller test bench are vehicles with particle emissions of less than or equal to 0.005 g/km. Passenger cars approved under the heavy-duty regime with an engine test on a test bench are vehicles approved according to Euro 6/VI.

For vehicles with a factory-installed particulate filter, it is already stipulated that the particulate filter must be present and cannot be obviously defective. This is verified by visual inspection. This new permanent requirement adds that the particulate filter must also work properly. This is verified by measuring the number of particles in the tailpipe. The number of particles per cubic centimetre is not tested during the general periodic inspection in order to issue an inspection report. Proper functioning of the particulate filter is not checked for diesel vehicles with aftermarket, half-open particulate filters.

B
For diesel commercial vehicles with a factory-installed particulate filter, a new permanent requirement is added as row 12 to Article 5.3.11, stating that the particulate filter must work properly. This covers both light commercial vehicles, i.e. delivery vans with a total vehicle weight of less than or equal to 3 500 kg, and heavy-duty commercial vehicles, i.e. trucks and buses with a total vehicle weight of over 3 500 kg. A provision is inserted into rows 9 and 10 stating that the environmental classification may also be obtained from the registration certificate. This way, this requirement also applies to foreign Euro 6/VI diesel commercial vehicles passing through the Netherlands. This Part for commercial vehicles is the same as Part A for passenger cars.

C
For diesel buses with a factory-installed particulate filter, a new permanent requirement is added as row 11 to Article 5.3a.11, stating that the particulate filter must work properly. Diesel buses can only be approved under the heavy-duty regime for trucks. This Part for buses is also identical to Part A for passenger cars and Part B for commercial vehicles. A provision is inserted in row 9 stating that the environmental classification may also be obtained from the registration certificate. This way, this requirement also applies to foreign diesel buses passing through the Netherlands.

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F
This Order deals with the requirements in order to receive the re-inspection certificate.

H
This Order deals with the period of validity of the inspection certificate of measuring devices.

W
In Chapter 8, Part 4, § 9 deals with the General and Technical Requirements for the 'particle counter' measuring device inserted in Article 8.1.3(1)(j). NMi drew up the specifications for this new measuring instrument according to the format of the International Organisation of Legal Metrology (OIML). Because the specifications on the 'exhaust gas analyser with lambda measurement' were taken as a starting point, the structure and a large number of the requirements on the exhaust gas analyser can be copied over directly for the particle counter. As a result, the arrangement of the former § 9 is largely retained.

The new particle counter measures the volumetric concentration (number per cubic centimetre) of the number of solid particles in the exhaust gas of a vehicle. The main specifications for the particle counter are as follows:
- the measuring device is usable with both petrol and diesel vehicles;
- the particle counter consists of a gas treatment system, a system for removing volatile particles and a particulate number counter;
- the counter is characterised for a particle size of 80 nanometres;
- the system for removal of volatile particles has an effectiveness rating of 95 %;
- the particle size for verification of linearity is 80 nanometres +/- 5 %;
- the minimum measurement range is 5 000 to 5 000 000 particles per cubic centimetre;
- the response time (T95) including the sampling system is no more than 15 seconds;
- the measurement frequency of the particle counter is at least 1 Hz;
- at the indicated counting efficiency, the counter is characterised for the following particle sizes:

Detection efficiency	Particle size
20 – 60 %	23 nm +/- 5 %
60 – 130 %	50 nm +/- 5 %
70 – 130 %	80 nm +/- 5 %

Article 8.4.86a under '§ 9.3.2. Measurement programme' details the measurement procedure for the particle counter test. Before starting a measurement, the vehicle registration number and vehicle limit must be entered. After this the probe is inserted into the tailpipe. It is permitted to do this with the engine running, as well as to start the engine after the probe is inserted into the tailpipe. The measurement starts with a period of 15 seconds for stabilization of the measurement signal. This is followed by a logging time of at least 15 seconds in total for measuring the number of particles. The logging time may be divided into multiple periods with defined intervals. If the average over the total logging time is below the limit value, the vehicle passes the test. If, after the probe has

been inserted into the tailpipe, the measured value immediately increases to more than twice the limit value, the measurement procedure may be interrupted and the test has not been passed. This possible to speed up the measurement procedure is added to prevent possible unnecessary contamination of the particle counter.

AB
A new '§ 4 Particles', consisting of Articles 45e, 45f and 45g, related to measurement of the number of particles per cubic centimetre in the exhaust gas with a particle counter, is added to Annex VIII, Chapter 1, Title 3, Part 3. This further details verification of the new permanent requirement that the particulate filter of a diesel vehicle must work properly. Article 45e specifies the method for conducting a particulate filter test using a particle counter. Article 45f stipulates the limits for the number of particles per cubic centimetre and Article 45g contains several provisions on the inspection method.

The first paragraph of Article 45e states that the verification of proper functioning of the particulate filter is conducted by measuring the number of particles per cubic centimetre in the exhaust gases. Article 8.4.86 details the procedure for this measurement conducted with a particle counter. The verification applies to diesel vehicles with a factory-installed particulate filter. Although a particle counter is also suitable for measuring the number of particles in the tailpipes of petrol vehicles, the test procedure detailed in Article 45e is only intended for diesel vehicles.

As stated in the second paragraph of Article 45e, the test is conducted with an idle engine. The test does not require any specific vehicle conditioning. Thus, the test does not require preparations such as warmup runs to bring the engine up to temperature. It is permitted though to conduct the test with the engine at operating temperature. Particle emissions directly from the engine, i.e. before the particulate filter, are lower with a warm engine than with a cold one. This means that it is more easy to pass the test with the engine warmed up. A properly functioning particulate filter is highly effective at trapping particles. A properly functioning particulate filter will meet the limit by a wide margin, even if the engine is cold. If the particulate filter is removed or functioning very poorly, it will not pass the test.

It is recommended to conduct the test at a particulate filter soot load of over 10 %, because the filtration efficiency of the filter will be relatively stable and high. The filtration efficiency of the filter is only significantly reduced just after a complete particulate filter regeneration. The filter load is not an explicit part of the test procedure. The filter may not function as well just after a regeneration. For a particulate load of 10 %, a run of approx. 50 km is required. If the test is not passed, it is permitted to conduct another test at a higher particulate load after a run of approx. 50 kilometres.

Article 45f specifies the limit values for the number of particles per cubic centimetre. The exhaust gases from passenger cars, commercial vehicles and buses with diesel engines with particulate filters, with idle engines, may not contain more than 1 000 000 particles per cubic centimetre if the vehicle was commissioned before 1 January 2015, or 250 000 particles per cubic centimetre if the vehicle was commissioned after 31 December 2014. The date of

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1 January 2015 is based on the date of 1 January 2013, on which the Euro 5b standard for particulate numbers of 600 000 000 000 particles per kilometre came into force for passenger cars and delivery vans. In connection with the sale of the remaining stock of Euro 5a vehicles after 1 January 2013, and to keep administrative procedures simple, the stricter limit of
250 000 particles per cubic centimetre applies to all diesel vehicles with a factory-installed particulate filter that were first registered two years after the start date of the Euro 5b standard.

Article 45g gives several provisions on the method for inspection. Paragraph 1 stipulates that the inspection on the functioning of the particulate filter must be conducted by measurement on a stationary passenger car, commercial vehicle or bus with a particle counter that has been powered on for at least the warmup time indicated by the particle counter manufacturer.

Pursuant to paragraph 2, before each test it is also checked that the sampling system is in good condition, paying particular attention to damage to the sample hose and probe.

THE MINISTER FOR ENVIRONMENT AND HOUSING,

S. van Veldhoven – Van der Meer