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ABSTRACT FORM

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Title: [New particle number limit value for diesel cars in Switzerland:
Environmental policy framework and particle number measurement procedure](#)

Abstract: (300 min. – 500 max. words)

Part 1: Environmental policy framework

At the suggestion of the Environmental Commission of the National Council (*UREK-NR*), Switzerland is considering the introduction of a particle number limit value for diesel cars. The Environmental Commission has proposed limiting the emission of particles from new diesel cars imported and taken into service after 2006 to the lowest level possible using modern technology. In response, the Swiss Agency for the Environment, Forests and Landscape (SAEFL), in collaboration with the EMPA and other experts, has prepared a draft ordinance specifying a new particle number limit value of 10¹¹/km. The new limit value covers particles in the range 20 to 500 nm, and is intended as a temporary arrangement supplementing the EURO 4 particle mass limit value prior to introduction of the new EURO 5 particle number and particle mass limit values.

The draft ordinance also lays down the procedure by which the number of particles emitted by diesel cars are to be determined (see Part 2 prepared by the EMPA). The procedure is based on the initial findings of the ECE-GRPE [Particle Measurement Programme \(PMP\)](#) Expert Group, and is to be finalised by 31 December 2004.

[Die schweizerische Bundesverwaltung prüft im Auftrag der Umweltkommission ihres Parlamentes eine Vorschrift zur Reduktion des Partikelaustrittes aus neuen Diesel-](#)

Personenwagen. Der beigelegte Verordnungsentwurf sieht vor, dass ab 2006 nur noch Diesel-Personenwagen in die Schweiz importiert und in Verkehr gesetzt werden dürfen, die den Partikelanzahl-Grenzwert von $10^{11}/\text{km}$ im Grössenbereich 20 bis 500 nm einhalten. Dieser neue Partikelanzahl-Grenzwert ergänzt den EURO 4 Partikelmasse-Grenzwert bis zur Einführung eines EURO 5 Partikelanzahl- und Partikelmasse-Grenzwertes. Das schweizerische Prüfverfahren zu diesem Partikelanzahl-Grenzwert lehnt sich an die ersten Ergebnisse der ECE-GRPE Expertengruppe „Particle Measurement Programme (PMP)“ an. Es wird bis Ende 2004 festgelegt und den interessierten internationalen Laboratorien zur Verfügung gestellt. Die Automobilhersteller lassen die Eidgenössische Materialprüfungs- und Forschungsanstalt (EMPA) prüfen, ob ihre für den Verkauf in der Schweiz vorgesehenen Diesel-Personenwagen den Partikelanzahl-Grenzwert einhalten.

It is intended for the test certifying compliance with the particle number limit value to be performed either by an approved Swiss test centre or by a foreign test centre approved for exhaust gas tests under the ECE regulations or EC directives. To ensure compliance with the new limit values, foreign test reports will be examined by an approved Swiss test centre, which will issue an approval certificate. Certification will be granted only on the basis of authentication by an approved Swiss test centre.

Switzerland is notifying the WTO and the EFTA of the existence of the draft ordinance concerning the determination of the number of particles emitted by diesel cars until June 2004. Subsequently, the Federal Council will respond to the proposal of the Environmental Commission.

Part 2: Particle number measurement procedure

The measurement procedure described in this ordinance is based on particle number counting by a condensation particle counter. The sample is taken from the CVS full flow tunnel and is conditioned by an additional dilution unit and a thermal evaporation unit. By this way the volatile particles (nucleation mode) are removed and only solid particles are detected.

Practical tests of the measuring procedure and an inter-laboratory test at the national level are carried out in spring and summer 2004 to evaluate the defined methodology, following which the draft will be revised and updated. The tests include measurements on different diesel vehicles with particle traps and different models of condensation particle counters.

Short CV:

Dr. Manon Delisle is Head of the Transport Section of the Air Pollution Control and Non-Ionising Radiation Division of the SAEFL. She is concerned primarily with PM10 emission from road traffic and with measures to reduce it.

Dr. Martin Mohr is Head of particle emission group of Laboratory for I.C. engines of EMPA. He holds a Master in Physics.

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New particle number limit value for diesel cars in Switzerland

Environmental policy framework

Presentation by
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Dr. Manon Delisle, Head of Traffic Section – 8th Internat. ETH Conference on Particles – 16 August 2004

New particle number limit value for diesel cars

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New particle number limit value for diesel cars

1. Standpoint of the SAEFL to the ultrafine particles

Health consequences of ultrafine particles

- Origin of inflammatory processes
- Functional impairment of the lung
- Increased risk of heart attack
- Systemic effects in the whole body via the blood
- Increase in sudden deaths
- Carcinogenic effects

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For health reasons it is important

- **to measure**
- **to control**
- **to reduce**

ultrafine solid particles

Standpoint of the Swiss Agency for the Environment, Forests and Landscape (SAEFL) and the Federal Roads Office (FEDRO)

New particle number limit value for diesel cars

Conclusion of the SAEFL

- **The measure of the mass of particles has to be completed through the measure of the number**
- **A particle number limit value and a measurement programme have to be developed**

New particle number limit value for diesel cars

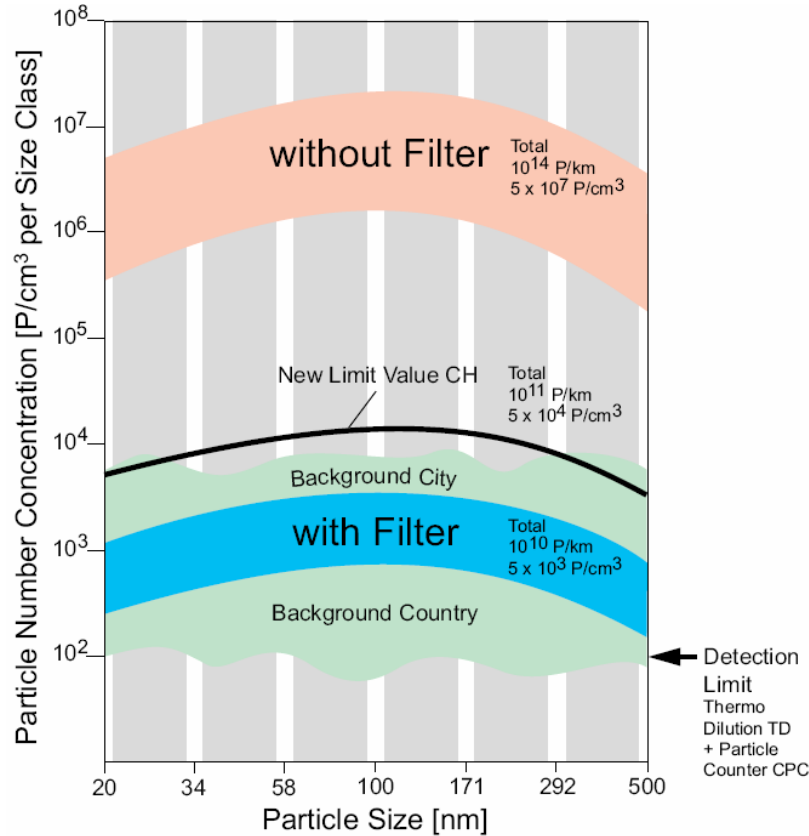
2. Necessary technical conditions

- Particle number limit value
- Measurement programme for particle number

Particle number limit value

Number

Health related emission limit
for diesel cars
(total particles 20-500 nm)



Without filter

10¹⁴ P/km

With filter

< 10¹⁰ P/km

Detection limit

10⁸ P/km

New emission limit

10¹¹ P/km

Technical conditions: particle number limit value

Particle number limit value

- $10^{11}/\text{km}$
- range 20-500 nm
- supplements EURO IV particle number limit value
- applicable until EURO V particle number limit value in force

Technical conditions: particle number limit value and measurement

Expert group

- Swiss Agency for the Environment, Forests and Landscape (SAEFL)
- Swiss Federal Roads Authority (FEDRO)
- Federal Office of Metrology and Accreditation (METAS)
- Swiss Federal Laboratories for Materials Testing and Research (EMPA)
- Biel Institute of Technology and IT (HTI Biel)
- Aargau College of Technology (FH Aargau)
- Mayer TTM
- Matter Engineering

Technical conditions: particle number limit value and measurement

Time schedule

Definition of test procedure	by March 04
Practical testing of the particle number measurement method at the EMPA	by August 04
Inter-Laboratory tests at the EMPA and Biel Institute	by October 04
Revision of test procedure	by November 04

➤ **More on this in Dr. Martin Mohr's presentation, session 8**

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3. Measures

- Regulation
- Incentive

Measure: regulation

Proposal of the Environmental Commission of the National Council (UREK-No. 03.3572)

Regulation on the limitation of particle emission

- for all new diesel cars
- from 2006 onwards
- based on current technology

Measure: regulation

Detailing of the proposal

Test for assessing compliance with the particle number limit value

- test in Switzerland and abroad
- Swiss certification of foreign test reports
- establishment of particle filter classes

Measure: regulation

Further steps

- notification of WTO and EFTA (limit value and test procedure) summer 2004
- Federal Council's response to proposal autumn 2004
- parliamentary procedure subsequently

Measure: incentive

Incentive for cars

- for all new imported cars
- from 2007 onwards
- under the import tax framework

Measure: incentive

Increase in import tax

- for all cars
- increase of 2 to 4% of the imported value

Amounts on average to approx. 550.- to 1'100.- CHF for cars

Measure: incentive

Bonus

- for low-consumption petrol cars
- for low-consumption diesel cars complying with the particle number limit value

Measure: incentive

Estimate of bonus for 2003

On average approx. 5'000.- to 10'000.- CHF per car

Percentage of particle filters: 6 % of imported diesel cars

Trend

Bonus drops as more cars are fitted with particle filters

Measures: regulation and incentive

Public health and national economic benefits

Particle filters reduce particle mass by $> 95\%$

Particle filters reduce particle number by $> 99\%$

Measures: regulation and incentive

Public health and national economic benefits

Regulation

PM10 emission in diesel exhaust practically eliminated by 2020

Incentive

Assumption: 25 % diesel cars fitted with particle filters by 2020

Measures: regulation and incentive

Public health and national economic benefits

Total reduction by 2020	Compulsory from 2006	Incentive from 2007
Tonnes PM10	6'000	1'450
Children with acute bronchitis	11'800	3'000
Premature deaths	870	220
Public health costs in million CHF	2'800	700

New particle number limit value for diesel cars

4. Conclusion

- **The technical feasibility of the measurement method to determine the particle number is now being tested. Definitive results for end 2004**
- **The “regulation” and “incentive” measures are clearly beneficial from a public health and national economic standpoint**
- **The implementation of the two measures depends on political acceptability in Switzerland and the EU**

New particle number limit value for diesel cars

Thank you very much for your attention