



Date

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Guidance for Construction Machine Original Equipment Manufacturers (OEM's) & their engine manufacturers

The present document deals with the conformity procedure, according to the Ordinance on Air Pollution Control (OAPC), for OEM's who supply machines fitted with diesel engines for use on construction sites in Switzerland. It also applies to engine manufacturers who provide type-approved (97/68/EC) engine and filter systems for factory installation by construction machine OEM's.

For the purpose of this document, a construction machine is any diesel powered machine or appliance used on a construction site.

This document particularly recognizes that OEM's may produce machines which are already **capable** of complying with the with the OAPC requirements at the point they leave the factory. It sets out the options for conducting the necessary tests, obtaining the necessary approvals and installing the necessary labels for the use of such machines on construction sites in Switzerland.

OAPC requirements on construction machines

According to OAPC annex 4, clause 3 (section 31), the following emission requirements for construction machines have to be met:

1. Emissions from construction machines must meet the relevant requirements for the corresponding year of manufacture for mobile machines and appliances in accordance with Directive 97/68/EC.

and

2. In addition, exhaust emissions from construction machines may not exceed the particle count of 1×10^{12} 1/kWh for solid particles with a diameter greater than 23nm, calculated on the basis of the current recognised status of technology, namely the UN/ECE particle measurement programme PMP, and in accordance with the NRSC and NRTC test cycles specified in Directive 97/68/EC.

or, as an alternative to section 31 sub-section 2 above (PMP):

3. The requirements cited in section 2 above shall be deemed to be met if the construction machine concerned is operated with a particle filter system that meets the requirements of section 32.

Section 32: Requirements on diesel particle filter systems (DPF)

In the case that use of sub-section 3 of section 31 is selected instead of sub-section 2, the requirements of the filter system are as follows:

1. Particle filter systems for construction machines must meet the following requirements:
 - a. They must separate 97 percent of solid particles with a diameter between 20 and 300 nm in new condition and after running uninterruptedly for 1,000 hours in typical operation;
 - b. They must separate 90 percent of solid particles during the regeneration process;
 - c. They must be equipped with an electronic monitoring device that records pressure losses that could lead to faulty operation and thus trigger an alarm, and which in the case of damage also interrupts the input of additives;
 - d. With free acceleration of the engine, they must remain below an opacity coefficient of 0.15 m^{-1} ;
 - e. They must be constructed in such a manner as to ensure that they cannot be installed in the reverse flow-through direction;
 - f. They must be supplied with cleaning and maintenance instructions;
 - g. They must be operated without additives containing copper or catalytic coating containing copper in the exhaust treatment system;
 - h. They must limit the secondary pollutant emissions that arise during operation to an extent that is technically and practically feasible, and economically tolerable.
2. Measurement and test procedures must be based on the current recognised status of technology, namely SNR 277205.

For particle filters system types that are included in the FOEN Filter List, the requirements of section 32 are deemed to have been met.

Important Note:

Regardless of the method chosen to demonstrate compliance to the OAPC requirements, it is necessary to obtain a certificate of conformity from EMPA, the official certification bureau recognized by FOEN, unless the filter system used is already included in the FOEN Filter List.

The following page explains the alternative approaches that may be used.

Required tests and formalities (alternative cases)

The following cases describe alternative test and conformity procedures for the engine family and for the particle filter system family respectively.

Case 1. Fulfilment of the requirements for an engine family (definition of engine family according to Directive 97/68/EC) – particle number (PN) limit value (OAPC annex 4, section 31, sub-section 2).

- Conduct measurement of PN over NRSC and NRTC (cold and hot) tests of parent engine, each cycle run once, PN test procedure according to UNECE PMP Heavy Duty Test Protocol (see ECE Reg. 49, Annex 4C, Particle Number Measurement Test Procedure),
- Tests performed and/or witnessed by laboratory accredited according to ISO 17025 with extension for UNECE PMP and recognised by FOEN,
- Written declarations of the OEM about how the marking & labeling requirements (OAPC annex 4, clause 33) will be fulfilled,
- Submission of results and written materials to the testing laboratory for the testing of conformity and to the conformity bureau (EMPA) for the evaluation of conformity.

Valid for all types of construction machines, where an engine of the approved engine family is installed. The certificate of conformity is issued for the approved engine family and shall either list the construction machines (OEM's name and machine type designation) in which the engine can be installed, or, alternatively, it shall list the EU emissions (97/68/EC or equivalent) type approval number for the approved engine family.

Case 2. Fulfilment of the requirements for a DPF family- according to OAPC annex 4, section 31, sub-section 3 and section 32 respectively (as alternative to particle number measurement)

- Conduct tests of DPF according to SNR 277205 [for OEM's and engine manufacturers producing complete type-approved (97/68/EC) engine and filter systems for OEM factory installation, the tests required are: filtration new (SNR 277205 Step B); secondary emissions (SNR 277205 Step D) and filtration after at least 1000 h of service accumulation (SNR 277205 Step G)],
- Tests must be performed and/or witnessed by laboratory accredited according to ISO 17025 with extension for SNR 277205 and recognised by FOEN,
- Written declarations of the OEM (eg. reports) justifying how the requirements c to h (OAPC annex 4, section 32) are fulfilled, or supplementary testing,
- Written declarations of OEM about how the marking & labeling requirements (OAPC annex 4, section 33) will be fulfilled,
- Submission of results and written materials to the testing laboratory for the testing of conformity and then to the conformity bureau (EMPA) for evaluation of conformity.

Validity for 1 family of DPF's (all sizes and applications) according to SNR 277205.

Notes:

- a) Step G may be performed on a DPF that has been subjected to service accumulation on an engine dynamometer for the purpose of determining a deterioration factor (DF) for

40CFR1039 certification or 97/68/EC type approval. In this case the OEM must provide details of the service accumulation that was performed on the filter.

- b) Step D may be fulfilled by providing an existing report in the case that evaluation of the secondary emissions listed in SNR 277205 has already been performed for a filter system with a similar coating (from the same supplier) of similar or greater total precious metal loading to that being used by the OEM. In this case the accredited laboratory may accept the existing test report and a declaration from the OEM of the similarity between the filter systems.
- c) It is permitted for the necessary markings & labels (OAPC annex 4, section 33) to be applied by the importer or dealer in Switzerland, before the machine is placed into service, in case these have not been installed at the factory of the engine manufacturer or OEM.