TA

Technische Anleitung
Technical Instruction
Instruction technique

TA-023/20

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VERT CONFORMITY-EXTENSION

Initiation

VERT, an industrial working group with a network of interdisciplinary health effect research, developed solutions from 1994 onwards to largely eliminate the particulate emissions of combustion engines, which had been recognized as carcinogenic, which in turn required the application of best available technology BAT according to Swiss legislation USG. Based on the knowledge the biological processes and the physical, chemical and combustion engine operating conditions, VERT introduced the particle number quality criterion PN in addition to the particle mass PM for the pollutant definition with the following formula "*number concentration of solid particles in the respirable size range 10-500 nm*", which ultimately became the basis for the worldwide triumphal march of the particle filter for all combustion engines. VERT consequently has developed test procedures and metrology for this purpose, and has established evaluation criteria that are published in the VERT Filter List, which lists all systems that have been successfully tested and found to comply with these criteria since.

What was considered BAT in 1994 was no longer so in 2000, so the criteria had to keep up with the development of the technology and the requirements were adapted accordingly. VERT thus became the worldwide "golden standard" and a model for many other regulations. This dynamic naturally meant that the conformity of the products had to be checked regularly, i.e. every 5 years, in order to comply with the state of the art in terms of optimum health protection.

For the Swiss market, the FOEN kept updating the filter list and checked the validity of conformity. Conformity updates were also incorporated subsequently into the international VERT list.

As of 31.12.2019, Swiss FOEN did no longer maintain this list, since, according to the European directives, all imported construction machinery now has particle filters that meet the requirements of the LRV, so that no more retrofitting is needed in Switzerland in this sector. In order to guarantee BAT for all other sectors and international validity, VERT must therefore take responsibility for updating conformity for all VERT certified products as listed in the VERT filter list.

Validity of VERT Conformity

According to the rules set out in the VERT filter list, VERT conformity is valid for 5 years based on ISO 17065. In addition, the validity of the VERT certificate is subject to the condition that the failure rate of a filter family does not exceed 3% per year and further that the manufacturer fulfils the voluntary commitments according to chapter 4 of the VERT list (www.vert-certification.eu). Previously, the FOEN had assumed responsibility for conformity control with EMPA, but this task now falls back to VERT and must be incorporated into the mechanisms of VERT certification. For international validity in Switzerland, conformity assessment is based on MRA, the Agreement between the Swiss Confederation and the European Community on mutual recognition in relation to conformity assessment.

Motivation for the extension

The validity of a declaration of conformity is generally limited to 5 years, therefore a corresponding procedure is required for the extension of VERT conformity. This extension must be recognizable by the wording of the confirmation of conformity, which is enclosed with each delivery of the corresponding product. Furthermore, the extension assures the customer that the quality of the product is monitored by VERT as an independent body and this will increase the customer's confidence.

Moving targets

VERT stands for "best available technology". If the nanofiltration technology available on the market shows that the separation of solid particles in the size range of 10 ÷ 500 nm and other health-related properties can be further improved, the VERT criteria will also have to be further tightened.

In the present context, therefore, it is important that any extension does not confirm the results of the previous certification, but that the current targets are met, i.e. it must be shown that the product meets the VERT criteria at the time of the review.

Conditions for renewal

In principle, the following three conditions apply

- It must be shown that the product is offered on the market, even if perhaps only in certain niches. For this purpose, the sales figures of the last 3 years must be provided, which, like all data in this context, are treated in strict confidence.
- The manufacturer must prove that the failure rates were below 3% per year on average over the last 3 years. A failure is defined as damage that has led to the complete replacement of the filter.
- The extension can only be granted to the manufacturer himself who is also the holder of the original certification and not to a local dealer.

Formal procedure for granting the extension

1. All filter manufacturers currently on the VERT list and whose certification dates back more than five years will be contacted by the VERT-SC after the conformity period has expired to ask whether the manufacturer wishes to remain on the VERT filter list and thus apply for an extension.

2. The manufacturer will then be asked to complete a comparative specification (annex) showing how the filter currently offered differs from the one originally certified version.

3. On this basis, VERT-SC will decide whether an extension is possible by purely administrative means or whether additional testing is required.

4. Test must then be carried out by one of the VERT accredited testing bodies and the test reports must be submitted to the VERT-SC to confirm conformity.

5. If the product complies with all conditions, the manufacturer receives the VERT Extended Certificate as formal proof to the customer or authorities, see appendix, which is double authenticated by VERT in the usual way, namely by the signature of the 3 members of the independent VERT-SC and by the VERT validity stamp with date.

6. On request of the manufacturer the VERT filter list will be updated accordingly and the manufacturer will receive an invoice from VERT financial department to cover this service.

Remaining rights after refusal of an extension

If the inspection reveals that the particulate filter system does not meet the current requirements but does meet the previous criteria valid at the time of the original certification, the manufacturer has two options: either he can make improvements and apply for re-testing, or he can leave the system in its previous condition in order to operate replacement deliveries only. However, new retrofits may not be carried out with it.

If the system no longer fulfils the previous criteria, an improvement must be made, which must be checked again, or it must be removed from the VERT filter list.

Validity of this document

This document has been written for the example of the diesel particulate filter. However, it is valid by analogy for all VERT-BAT products for exhaust emission control that are included in the VERT list, including GPF, SCR systems, filter substrates, FBC, electronic OBD and NPTI measuring devices and, in line with the VERT strategy, for wood combustion filters, cabin filters and virus filters.

Abbreviations

- ASTRA	Swiss Roads Office
- AUVA	Österreichische Unfall Versicherungs Anstalt
- BAT	Best Available Technology
- BauRLL	FOEN Construction Directive Air
- FDJP	Federal Department of Justice and Police
- FOEN	Federal Office for the Environment
- LRV	Clean Air Ordinance of Switzerland
- NEAT	New European Alps Transversal
- NRMM	EU Directive for Nonroad Mobile Machinery
- PAH	Polycyclic Aromatic Hydrocarbons
- SN	Swiss Technical Standard (Norm)
- SUVA	Swiss Accident Insurance Institution
- TBG	Tiefbau Berufsgenossenschaft Germany
- USG	Umweltschutzgesetz
- VERT-SC	Scientific Committee VERT
- VERT	Verification of Emission Reduction Technology, Association
- VSBM	Association of the Swiss Construction Machinery Industry

Sources

- VERT filter list www.vert.certification.eu
- SN 277206 https://shop.snv.ch/Norm/Verbrennungsmotoren-fuer-Kraftfahrzeuge/SN-277206.html
- Technical instructions for exhaust gas maintenance and control and instrumentation www.vsbm.ch/fileadmin/vsbm/dokumente
- Legal basis "Agreement between the Swiss Confederation and the European Community on Mutual Recognition in relation to Conformity Assessment and "Federal Act on Technical Barriers to Trade". www.seco.admin.ch/seco/de/home/Aussenwirtschaftspolitik_Wirtschaftliche_Zusammenarbeit/Wirtschaftsbeziehungen/Technische_Handelshemmnisse/Mutual_Recognition_Agreement_MRA0/MRA_Schweiz_EU.html
- TA-002/18 Best Available Technology www.vert-crtification.eu
- TA-003/18 VERT Testing of Particle Filters www.vert-crtification.eu
- TA-005/18 VERT Approval Criteria for Particle Filters www.vert-crtification.eu
- TA-006/18 VERT On Board Control for Particle Filters www.vert-crtification.eu
- TA-009/18 Self Commitments of VERT Certified Enterprises www.vert-crtification.eu
- TA-022/19 VERT Accreditation of Testing Organizations www.vert-crtification.eu

Appendices:

- Appendix 1: The Development of VERT Certification
- Appendix 2: Application for renewal of conformity
- Appendix 3: Certificate of renewal
- Appendix 4: Summary Information Sheet
- Appendix 5: Confirmation of the Applicating Company

The VERT certification procedure for exhaust emission control is based on a strict separation of responsibilities in the course of the procedure:

A. The test procedure is defined by a Swiss Standards Committee SNV in accordance with the international rules for the preparation of technical standards.
B. The determination of the quality criteria is carried out by the General Assembly of VERT members at the request of the VERT Scientific Committee.
C. The tests are to be carried out by accredited testing bodies that must undergo a VERT accreditation process in accordance with TA-022/19.
D. Conformity assessment is carried out by the VERT-Scientific Committee, a body of 3 designated experts appointed by the VERT Board, but independent in their judgement. Their decision must be unanimous.

Legal Status of the VERT-Filter List

The VERT Filter List is an international technical consensus standard and has no legal validity in itself. It has however become a legally binding code in many countries for different applications where authorities require “Best Available Technology” due to the fact that particles emitted by combustion engine have been classified “carcinogen for humans” class 1 by the WHO in 2012

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Publisher

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www.VERT-certification.eu

Appendix 1

The VERT Certification of Particulate Filters according to Best Available Technology BAT

SUVA had already introduced a limit value for particulate emissions from diesel engines in 1994 (EC < 100 mg/m^3 EC) and declared these emissions to be carcinogenic based on WHO 1988. According to the Swiss Environmental Protection Act Art. 11.3 USG, this has led to the mandatory minimization requirement and the demand to use best available technology BAT.

The first application came with the NEAT and triggered the VERT project. Within the scope of this project, specifications for DPF soot particle filters for diesel exhaust gases were developed from 1994 onwards with the aim of achieving the best possible filtration according to the number criterion of solid particles in the size range 10-500 nm. Stakeholders of this working group were SUVA, TBG, AUVA, FOEN and the technical support group VERT. A test procedure (VERT suitability test) has been developed and filters that had passed this test were published for the first time in a list on 14.4.1998, together with other filters of which "positive field experiences had become known".

The first objective was to provide usable systems for the tunnel construction sites that were approaching, which fulfilled the legal requirement "technically and operationally possible and economically viable". The catalogue of requirements did not yet include an endurance run and secondary emission test.

Severe technical setbacks, additional regulations and the sobering realization that these filter systems could also generate toxic substances, so-called secondary emissions, which almost caused the project to fail, quickly led to step-by-step adjustments. New requirements were adopted in such a way that only filters were approved which had proven their operational suitability over 2000 operating hours, whose exhaust gas also had proven not to contain toxic substances such as dioxins, furans, nitro-PAH etc. and whose regeneration behavior was electronically monitored. In addition, breakdowns and failures were consistently investigated, systems with frequent failures were removed from the list, and all filters were marked with a VERT label and an individual serial number.

By 2002, a filter standard had thus gradually become established which was mandatory for the SUVA filter requirement from 1.3.2000 (www.suva.ch/de-CH/material/Factsheets/partikelfilter), for the Construction Directive from 1.9.2002 (www.bafu.admin.ch/bafu/de/home/themen/luft/publikationen-studien/publikationen/luftreinhaltung-auf-baustellen.html) for road vehicles in accordance with the FDJP directive of 7.8.1990 and for underground particle filter retrofitting in Germany and Austria.

In 2003, the guideline "Exhaust gas system maintenance and control" was elaborated as a supplement in cooperation with VERT, the construction industry VSBM (www.vsbm.ch/fileadmin/vsbm/dokumente), the FOEN and the Federal Roads Office as an aid for the handling of particle filters in practical application and as a guideline for control by the cantonal test centers. The development of a field measuring device for controlling the number of emissions was started with the ETH (Prof. H.C. Siegmann) and Matter Engineering AG (NanoMet).

From then on the specifications were adapted to the state of the art and the growing experience. In particular, numerous safety aspects and anti-manipulation criteria were introduced and the separation of ultra-fine particles was increased to 98% for all lung-critical size classes.

In 2009, the VERT test procedure has been converted into a Swiss Standard SN 277206 (https://shop.snv.ch/Norm/Verbrennungsmotoren-fuer-Kraftfahrzeuge/SN-277206.html),
which is still valid today, and the FOEN introduced a conformity procedure in the LRV 2008, according to which filters tested according to the VERT procedure had to be checked for compliance with the criteria laid down in the LRV before they were released for sale in Switzerland, see FOEN website (https://www.bafu.admin.ch/bafu/de/home/themen/luft/fachinformationen/partikelfilterliste.html).
At the same time, VERT and FOEN introduced the maximum conformity validity period of 5 years in accordance with ISO 17065 and the EU legislation.

Appendix 2

Application for Change of Specifications or Extension of VERT-Conformity of a VERT certified DPF System

according to VERT / SN 277206

Company

Street / No

Postecode / City

Phone / Fax

E-mail

Previous system name	
Certification Number	
Certification year	
New system name	
New Substrate(s)	
New Regeneration Method	

We request to:

recognize the new specifications on the ☐ VERT List

extend the VERT conformity ☐ VERT List

City, Date Stamp / Signature (Company) _____

Filled in conformity control

Necessary administrative measures:

Necessary tests:

City, Date Stamp / Signature (AFHB) _____

Attachments

- Comparison of Table D.1 from SN 277206
- List of documents and emission data

Appendix 2

Attachment 1: DPF Substrate

SN 277206, Tab. D.1 (Comparison)

Particle filter system (whole system)		
	Previous system	New system
Manufacturer of filter system (whole system)		
Name of particle filter family *)		
Particle filter type		
Serial number of test object		
Filter element and catalytic converter		
Filter element	Previous system	New system
Manufacturer of filter medium		
Type		
External dimensions [mm]		
Filter volume [dm^3]		
Filter surface (total surface area) [m^2]		
Weight [kg]		
Material		
Porosity [%]		
Pore size [µm]		
Number of cells per square inch [CPSI]		
Wall thickness [mm]		
Maximum flow-through rate [m^3/s]		
Maximum space velocity [s^{-1}]		
Maximum operating temperature [°C]		
Storage capacity for soot/ash [g]		

*) Filter systems which are based on the same filter technology, and which contain the same main components and are similarly designed and only differ in terms of size and geometry (e.g. radial versus axial flow), comprise a filter family

Appendix 2

Attachment 2: Catalyst Substrates pre and post

SN 277206, Tab. D.1 (Comparison)

Precatalyst	Previous system	New system
Manufacturer of filter medium		
Type		
External dimensions [mm]		
Filter volume [dm^3]		
Filter surface (total surface area) [m^2]		
Weight [kg]		
Material		
Porosity [%]		
Pore size [µm]		
Number of cells per square inch [CPSI]		
Wall thickness [mm]		
Maximum flow-through rate [m^3/s]		
Maximum space velocity [s^{-1}]		
Maximum operating temperature [°C]		
Storage capacity for soot/ash [g]		
Postcatalyst	Previous system	New system
Manufacturer of filter medium		
Type		
External dimensions [mm]		
Filter volume [dm^3]		
Filter surface (total surface area) [m^2]		
Weight [kg]		
Material		
Porosity [%]		
Pore size [µm]		
Number of cells per square inch [CPSI]		
Wall thickness [mm]		
Maximum flow-through rate [m^3/s]		
Maximum space velocity [s^{-1}]		
Maximum operating temperature [°C]		
Storage capacity for soot/ash [g]		

Appendix 2

Attachment 3: Catalyst Coatings

SN 277206, Tab. D.1 (Comparison)

Regeneration		
	Previous system	New system
Regeneration procedure		
Minimum exhaust temperature for beginning of regeneration [°C]		
if catalytic coating		
Filter element	Previous system	New system
Manufacturer of coating		
Coating: Catalytically active elements		
Wash Coat: Catalytically active elements		
Concentration of catalytically active elements [g/ft^3]		
Pre-catalyst	Previous system	New system
Manufacturer of coating		
Coating: Catalytically active elements		
Wash Coat: Catalytically active elements		
Concentration of catalytically active elements [g/ft^3]		
Post-catalyst	Previous system	New system
Manufacturer of coating		
Coating: Catalytically active elements		
Wash Coat: Catalytically active elements		
Concentration of catalytically active elements [g/ft^3]		

Appendix 2

Attachment 4: Fuel Borne Catalyst FBC and Electronic Control Unit OBC

SN 277206, Tab. D.1 (Comparison)

if fuel borne catalyst (FBC)		
	Previous System	New System
Manufacturer of FBC		
Name of FBC		
Catalytically active elements		
Concentration of catalytically active elements in additive [mg/kg]		
Concentration of catalytically active elements in fuel [mg/kg]		
Dosage (additive per fuel) [ml/l]		
Additizing procedure		
Name of dosage device		
Electronic on board control unit (OBC)		
	Previous System	New System
Manufacturer of OBC unit		
Name of OBC type		
Serial number of test object		

Appendix 2

Attachment 5: List of documents and inspections
Please list and attach new drawings / new manuals / emission inspection data

1.
2.
3.
4.
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6.
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10.

Appendix 3

Valid only with VERT-stamp and validity-dates

VERT®-Certificate

No	**B416/06.15–2** VERT®-conformity extended to June 30. 2025
Product	**EHC** Particle-Filter System: EHC-HT Filter Module Glass fiber fleece Regeneration Disposal as industrial waste Electr.Filter Control: Peak pressure manometer
Manufacturer	EHC Technik ab Ögärdesväger 8a S-43330 Partille

We herewith apply to be listed in the VERT® filter-list and we accept rules and conditions as being published on the VERT® filter-list.

…… …… ……

Manufacturer -Stamp Date CEO Signature

Certified by the VERT®-Scientific Committee

…… …… ……

Dr. Andreas Mayer Prof. Dr. Jan Czerwinski Thomas Lutz

Appendix 4

Information Sheet

to extend VERT conformity of a VERT certified DPF system

In order to renew VERT Conformity, the manufacturer shall submit an application stating whether the specifications of the DPF system have been changed or not. If they have been changed, the changes must be entered in a 6-page form with the corresponding data table and signed with a legally valid signature.

In addition, the applicant shall provide the following information:

- *Market presence: The applicant shall provide the VERT conformity assessment body with sales figures for the last 3 years*

- *Failure rate: The applicant shall provide the VERT conformity assessment body with the number of failure reports over the last 3 years that have led to the replacement of filters.*

- *The applicant also confirms his willingness to participate in the IuC & CoP activities planned by VERT.*

After reviewing the documents, the VERT Conformity Assessment Body VERT-SC will inform the applicant what further steps are to be taken, in particular whether parts of the VERT filter testing based on SN277206 are to be performed.

The applicant may then have these tests carried out by a VERT-accredited testing agency and shall in turn submit the reports to the VERT-Conformity Assessment Body, which shall decide whether to grant an extension of conformity and renew the entry in the VERT list.

If no additional testing is required, the VERT Conformity Assessment Body may, at the request of the manufacturer, renew the entry in the VERT list and issue a new certificate indicating the fact of the extension of conformity and the new period of validity.

Invoicing for these VERT services is always done by the VERT Finance Department.

Appendix 5

Confirmation of the Applicating Company

for the Extension of the VERT-Conformity
or Recognition of Modified Specifications
of a VERT certified DPF System

In order to maintain the quality of the DPF-system for the next period of validity, the application manufacturer confirms following points:

1) *The manufacturer confirms that no modification of the DPF-system has been made since last certification or in case of modifications, he will communicate all modification made by the attached 6-page table to the VERT– conformity control body VERT-SC together with the application*

2) *The manufacturer will supply data on sales number and failure number of the related DPF system during the last three year.*

3) *The manufacturer confirms his disposition to collaborate for the next five years after extension of conformity in VERT activities towards In-Use-Compliance IuC and Conformity of Production CoP.*

Manufacturer:

Company:	Date:
Adress:	
Authorized person:	Signature*)

*) legally authorized signature with the stamp of company