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**Abgasprüfstelle**  
**Contrôle des gaz d'échappement**

# **VERT Filter Test, Phase 3 with the Lubrizol Engine Control System – UNIKAT DPF K18 on the Liebherr D914T construction engine.**

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according to the VERT<sup>\*)</sup> measuring procedures

**Ordered by:**

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**Report:**

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## **1. SUMMARY**

This report summarizes the investigations with the DPF UNIKAT K18 on a Liebherr construction engine.

The investigations comprise all measurements and evaluations that were performed on construction site engines within the scope of the VERT<sup>\*)</sup> project. The size distributions of the particulates were systematically measured besides the usual engine operating parameters, volatile pollution emissions and particulate mass emissions.

The analysis was performed at four operating points of the engine and during the regeneration attempt with electrical heating at standstill of the engine.

The results can be summarized as follows:

- UNIKAT K18 DPF reduces efficiently the PM
- with UNIKAT K18 DPF there is a very efficient filtration of nanoparticulates ( 99,99 %)
- UNIKAT K18 DPF eliminates completely the opacimetric acceleration smoke
- the electric regeneration of the trap works very well.

The investigated UNIKAT K18 filter fulfills the criteria of the VERT filter test phase 3 and can be recommended to the users.

## **2. INTRODUCTION**

The occupational health authorities of Switzerland, Austria and Germany: SUVA, AUVA and TBG together with the Swiss clean air authority BUWAL have performed the VERT project 1994-1999 to satisfy the increasingly stringent demands on air quality in underground workplaces and offroad [1].

### **Targets of VERT**

- Evaluate aftertreatment systems for existing engines to reduce particulate emissions to < 5 % of engine-out emissions levels - with respect to total EC+OC-mass and particle number count in the size range 10-500 nm
- Define certification procedures for such aftertreatment systems
- Establish rules for monitoring field emissions of offroad engines
- Define application guidelines in consensus with engine manufacturers and operators.

VERT was concluded 3/2000 [2] with application tools such as trap-system-specification, certification procedures and field monitoring standards and a list of VERT-approved trap-systems published in the SUVA/BUWAL-Filter-List [3], yearly updated. Only traps systems which have successfully passed the VERT-Filter-Test VFT will be listed in this document and they will only remain in this list if they continue to prove their quality in the field.

The particulate trap system has proved to be the only available effective measure to curtail particulate emissions. Regeneration of such traps requires appropriate technical means such as burners, heaters, catalytic coatings or fuel additives. All such means must be certified together with the trap system and quality-monitored in the field. Continuous electronic OBD is a further requirement to control such systems, which need to perform automatically and safe for the engines and the environment.

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<sup>\*)</sup> VERT... Verminderung der Emissionen von Realmaschinen im Tunnelbau