

LUBRIZOL
Engine Control Systems

Optimization of an Electrically Regenerated Diesel Filter System for North American Applications

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October 2004

Combifilter™ Concept

On-Board Regeneration:

- Heater base on board the vehicle
- Require the vehicle to be close to Control Panel & hook up at the end of each shift

The diagram illustrates the Combifilter™ system. It features an inlet section with an electrical heater, a center section with a filter, and an optional cattrap purifier. A backpressure monitor is connected to the inlet section. The system is controlled by a control panel with three gauges and a manual regeneration button. The control panel is connected to the heater and the purifier.

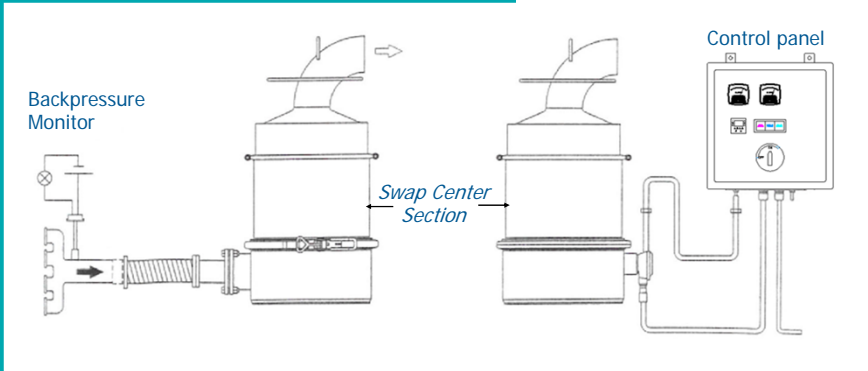
V-Type: Cordierite filter, 8 hours regeneration
K-Type: Silicon Carbide filter, 8 hours regeneration
S-Type: Silicon Carbide filter, 30-90 minutes regeneration

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Combifilter™ Concept

Off-Board Regeneration;

- No electrical components on vehicle
- Spare / exchange filter
- Require exchanging filters on vehicle and regeneration of soot laden filter at the end of each shift



Electrically Regenerated Diesel Particulate Filter System

- Used on lift-trucks in Europe since 1986
- Deployed on construction & utility vehicles since 1995
- Engineered for stationary application since 1999
- Approved by VERT (Swiss certification)
- Approved by Swedish Environmental Zone Certification



**Trial Vehicle – INCO Stobie Mine
Light Duty Kubota Personnel Carrier**

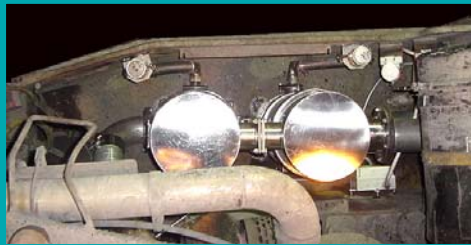


**Trial Vehicle – Inco Stobie Mine
Heavy Duty Scoop-tram**

**Scooptram retrofitted with
electrically regenerated diesel
particulate filter system**



The filter unit is installed in place of
standard muffler



Typical European Electrical System Components



Heater Base

Control Panel

Junction Box



Adapting the System to On-Board North American Mining Application

- ✓ Standard European On-Board system did not meet CSA or mining environment requirement
- ✓ CSA inspection to identify non-conformance electric components
- ✓ Electrical modification
- ✓ CSA Electrical Standard Approval
- ✓ Proper location for electrical components
- ✓ Vibration isolation
- ✓ Training



Features of New North American Combifilter™

- UL 508 Regeneration Control Panel
- OSHA safety blue
- Elimination of all electrical control on-board components
- Additional indicators for operating & failure modes
- Safety panel door locker when powered
- Engine start blocker when powered
- Power connector
 - Robust metal structure
 - No-Arc disconnect
 - Cuts panel power when disconnected



Personnel Training

- Ensure commitment to proper operation and maintenance of system.
- Log book to record when system regenerated.
- Simplicity of operation and maintenance
- Air supply hoses run over by vehicles.
- Masked maintenance triggers



Conclusion

- The new North American Combifilter™ system has been optimized for use in On-Board North American Mining applications.
- The electronics of the system conform with North American voltages and safety codes as built.
- The system has been simplified (fewer parts and no on-board electronic components).
- The system is also optimized for use in off-road applications.