

Exhaust Gas Temperature Shutdown Sensors

Exhaust gas temperature, coolant water temperature, and water level sensors are required on 30 CFR [part 36](#), permissible equipment. These sensors shutdown the engine before a fire or explosion hazard arises from the release of hot exhaust gas or high engine surface temperatures. Another Best Practice- *Weekly Maintenance Exhaust Gas Temperature Safety* discussed the need to maintain safety system shutdown sensors. This *Best Practice* describes a novel exhaust gas temperature sensor that MSHA has evaluated.

Permissible machines with either wet exhaust gas conditioners or dry exhaust gas conditioners and DPM exhaust filters are required to have exhaust gas temperature sensors that meet the requirements of [§7.98\(s\)\(4\)\(i\)](#) (185°F maximum exhaust gas temperature) and [§7.98\(s\)\(4\)\(ii\)](#) (302°F maximum exhaust gas temperature), respectively. Permissible machines are currently approved with adjustable exhaust gas temperature sensors activated by a wax element. Recently, Mac's Mining Repair of Huntington, Utah proposed the use of a specific sprinkler head as a replacement for the wax element exhaust gas temperature sensors. MSHA evaluated this sprinkler head and obtained preliminary field data.

- Vibration tests of the sprinkler head indicate that it should be able to withstand installation in a diesel engine exhaust system without nuisance trips.
- The reaction time of the sprinkler head was much shorter than the wax element type of sensor used on permissible equipment.
- The final shutdown temperature for the sprinkler head was much lower than that of the wax element sensor.
- The final shutdown temperature met the temperature limit in the regulation for a wet exhaust gas conditioner and was also well below the ignition temperature of typical paper diesel particulate filters when tested at a fast exhaust temperature rise with no water in the scrubber (fault condition).
- MSHA does not currently have sufficient information on the affects of corrosion on the sprinkler head. MSHA intends to monitor the use of the sprinkler head on permissible equipment to obtain this information.
- Unlike the wax element sensors typically used, the sprinkler head was not temperature adjustable or reusable if activated.
- Since shutdown sensors are critical safety items, the addition of sprinkler heads to safety systems on part 36 permissible machines must be approved by MSHA before they are installed.

Due to reports of filters fires on permissible equipment and the possible catastrophic consequences of these fires, MSHA encourages the mining industry to consider new technology, or as in the case of sprinkler heads, the novel use of existing technology to address the hazard of filter fires.

MSHA encourages equipment manufacturers and mine operators to submit applications for use of sprinkler heads or other devices that could improve the safety of permissible diesel-powered equipment. Please contact [Gary Clark](#), 304-547-2068, at MSHA's Approval and Certification Center for more information.