UPDATE ON THE EXAMINATION AND COMPARISON OF EXISTING HALON ALTERNATIVES AND NEW SUSTAINABLE CLEAN AGENT TECHNOLOGY IN SUPPRESSING CONTINUOUSLY ENERGIZED FIRES

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INTRODUCTION

This report is a continuation of "*Examination and Comparison of Existing Halon Alternatives and New Sustainable Clean Agent Technology in Suppressing Continuously Energized Fires*" presented at HOTWC 2001. This report includes testing of conductive and modified conductive heating tests using C_6 F-ketone. Initially, C_6 F-ketone preliminary tests were performed at a concentration of 3.5% [V/V] with extinguishments. During the modified conductive heating test (electrical arc) there was re-ignition. Requirements for higher concentrations are necessary to the cup burner. This report includes testing at minimum design concentration plus 20%, 40%, and 60% for extinguishing Class "C" energized fires.

OBJECTIVE

The objective of this report, was to update the previous examination using C_6 F-ketone on Class "C" energized fires: to extinguish and prevent re-ignition. Evaluation of modified test to address a fire hazard were the ignition source is constant and the cause of the event. Verifying extinguishment occurs at 3.9%, 4.5%, and 5.1% as well as, that re-ignition would not occur using these design concentrations.

RESULTS

The test results indicated that:

Conductive Heating Tests

- Extinguishing and preventing reignition/reflash was achieved using 20% below minimum design concentration.

Modified Conductive Heating Tests

- Higher agent concentrations were needed to prevent reignition/reflash with both cables.

- Higher agent concentrations were needed to extinguishing and prevent reignition/reflash using fire resistant cable (KS-5482L28FR).

Table 1: Test Protocol

Test Protocol	Fuel	Agent	Tests Conducted
Conductive Heating Test	10.25 in. long, 6 in. of insulation, KS-20921L2 and KS-5482L28FR	C_6 F-ketone	5
Modified Conductive Heating Test	10.25 in. long, 6 in. of insulation, KS-20921L2 and KS-5482L28FR	C_6 F-ketone	22

Table 2: Summary of C_6 F-ketone Selected Conductive Heating Test Results using KS-20921L2 Cable Type in a Vertical Orientation

Test	Ignition Source	Autoignition Achieved [Yes/No]	Ignition [s]	Discharge Pressure [kPa]	Design Concentration [%]	Discharge Time [s]	Time of Initial Ext. [s]	Reignition [Yes/No]
1	Pilot	No	595	655	2.6	655	661	No

Table 3: Summary of C_6 F-ketone Selected Modified Conductive Heating Test Results using KS-20921L2 Cable Type in a Vertical Orientation

Test	Ignition Source	Autoignition Achieved [Yes/No]	Ignition [s]	Discharge Pressure [kPa]	Design Concentration [%]	Discharge Time [s]	Time of Initial Ext. [s]	Reignition [Yes/No]
2	Electric Arc	Yes	510	655	3.9	615	623	No
3	Electric Arc	Yes	610	655	4.5	670	676	No
4	Electric Arc	Yes	481	655	5.1	549	579	No

Table 4: Summary of C_6 F-ketone Selected Modified Conductive Heating Test Results using KS-5482L28FR Cable Type in a Vertical Orientation

Test	Ignition Source	Autoignition Achieved [Yes/No]	Ignition [s]	Discharge Pressure [kPa]	Design Concentration [%]	Discharge Time [s]	Time of Initial Ext. [s]	Reignition [Yes/No]
5	Electric Arc	Yes	650	655	3.9	725	DNE	Yes
6	Electric Arc	Yes	855	655	4.5	935	951	No
7	Electric Arc	Yes	555	655	5.1	631	660	No

DISCUSSION & CONCLUSIONS

As previously noted the conducted test does not adequately address the extinguishing characteristics for a Class "C" energized fire scenario where the ignition is the cause of the flame. However the modified conductive test provides autoignition and the means to design C_6 F-ketone total flooding system to prevent reignition/ reflash in an actual cable fire event. The C_6 F-ketone extinguished and prevented reignition/ reflash at a much lower concentration than HFC-227ea.

REFERENCES

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