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Discharge of OXEO™ Extinguishing System in a Drop Ceiling Application

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Nathan Oetman

Project Engineer Associate

Viking Group Inc.

EXECUTIVE SUMMARY

An OXEO extinguishing system was discharged in a room with a drop ceiling application installed to understand if the ceiling is impacted by the discharge. Argon was exhausted through three nozzles in the room, one above the ceiling and two below. An agent concentration over 46% was achieved using a 200 BAR (2900 PSI) Argon system. The ceiling tiles closest to the nozzle were observed to raise slightly during the discharge but settled with minimal permanent damage after the test.

EXPERIMENT DETAILS

A 20’ x 40’ test room was constructed with a standard drop ceiling system. 2’ x 4’ USG Radar Basic lay-in ceiling tiles were used to construct the drop ceiling. The ceiling grid was designed and installed with hanger spacing according to the manufacturer recommendations. No ceiling tile hold down clips were used. The drop ceiling was placed 1 ft below the existing room ceiling and 6ft 9in above the floor.

Figure 1: Test Room with Drop Ceiling Installed

The OXEO system was configured using two sets of tanks. The system above the ceiling tiles utilized a 200 BAR (2900 PSI) pressure reduced system consisting of a single Argon tank and single 360° pendent nozzle located in the middle of the room. The system below the ceiling tiles utilized a 200 BAR (2900 PSI) constant flow system consisting of 6 Argon tanks and two 180°

nozzles on opposite sides of the room. One nozzle in pendant orientation and one nozzle in an upright orientation. All nozzles were positioned six inches from the tiles.

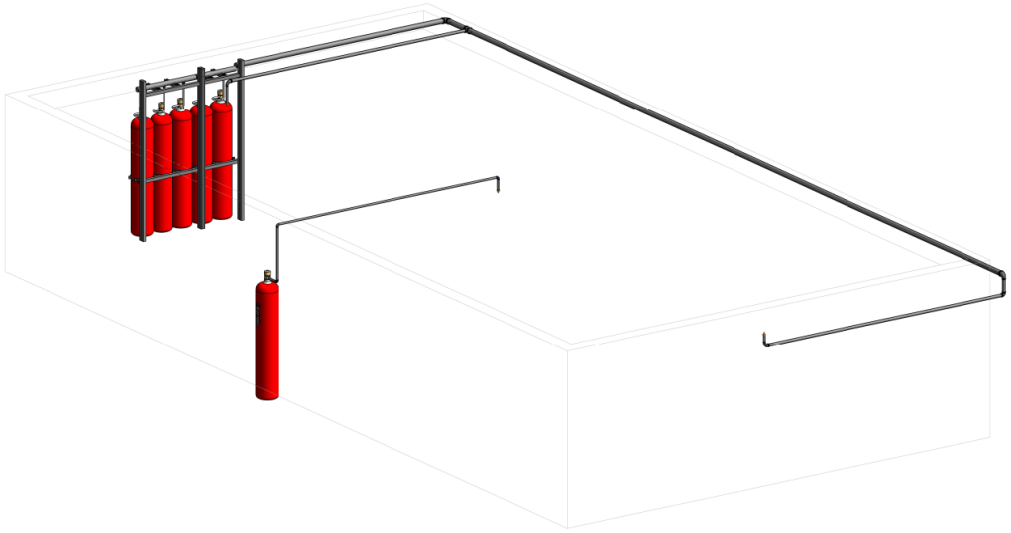

Figure 2: 3D Wireframe of Tank and Piping Setup

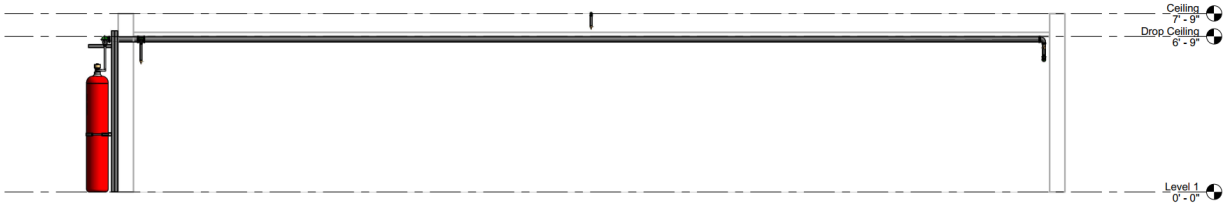

Figure 3: Side View of Tank and Piping Setup

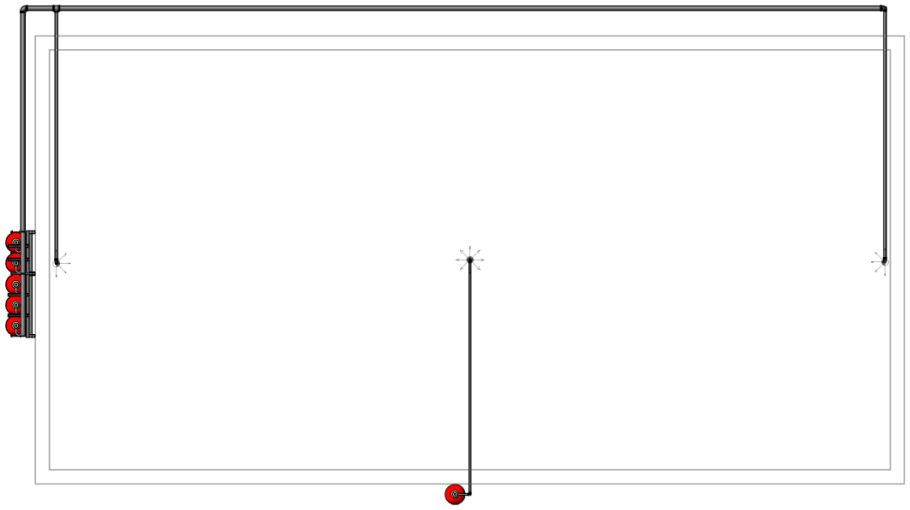

Figure 4: Floor Plan of Tank and Piping Setup

The above ceiling and below ceiling setups activated at the same time during the test. Video recordings captured the system activation from within the room while also monitoring live data of the oxygen concentration, system tank pressures, and nozzle pressures throughout the duration of the test.

RESULTS

During the activation, ceiling tiles were observed being lifted slightly from the grates near the nozzle above the ceiling and near the upright nozzle below the ceiling.

Figure 5: Ceiling Tiles Being Lifted from Grates During System Discharge

Although these tiles moved during the system discharge, the tiles remain mostly intact and stayed within the ceiling brackets. Only minor permanent damage could be seen on the corners of 2 tiles nearest to the nozzle above the ceiling. No structural or tile damage was found on the rest of the ceiling.

Figure 6: Permanent Damage Observed on Tiles Directly Below the Nozzle Above the Ceiling

Using the vInert software, agent target concencentrations of 46.3% below the ceiling tiles and 53.4% above the ceiling tiles were calculated for the systems. Peak agent concentrations of 46.9% below the ceiling tiles and 49.7% above the tiles were achieved during the test. Peak nozzle pressures of 51 BAR (737 PSI) below the ceiling tiles and 57 BAR (828 PSI) above the ceiling tiles were recorded during testing.

Video of this test can be found here: https://youtu.be/iEIYrkhxaVQ