

New Option for the Model 4525 Series

June 2021



Non-Fogging Plastic Scintillation Detectors

Ludlum Measurements now offers a new non-fogging plastic scintillation detector option for our Model 4525 Series. Developed by our subsidiary company Eljen Technology, a developer and manufacturer of organic scintillation material since 1997, these new scintillators are variants of Eljen's workhorse products, EJ-200 and EJ-208. The new products, EJ-200NF* and EJ-208NF*, are specifically designed for outdoor detector systems wherein the stresses of large temperature variations and moisture absorption (contamination) eventually lead to conventional plastic scintillators becoming foggy and failing to perform to requirements. Special hermetic housing is no longer needed for the "NF" variants.

COLLABORATION with the COUNTERING WEAPONS OF MASS DESTRUCTION (CWMD) OFFICE of the DEPARTMENT of HOMELAND SECURITY (DHS)

These products are the result of a four-year collaboration of Eljen with CWMD-sponsored research with a team of four national laboratories: Lawrence Livermore National Laboratory (LLNL), Sandia National Laboratory (SNL), Oak Ridge National Laboratory (ORNL), and the Pacific Northwest National Laboratory (PNNL).

PERFORMANCE PROPERTIES & TEST RESULTS

- Both "NF" products perform identically to their "non-NF" precursors. Their scintillation and optical properties are essentially identical. Eljen has two independent confirmations of this from manufacturers of RPM (radiation portal monitor) equipment who tested full-sized 60 in. and 70 in. long scintillators.

- Accelerated Aging Tests (AAT) at PNNL: At the conclusion of a 4-month-long test, a summary memo to Eljen stated the following: “Assuming one month of AAT equals one year of deployed exposure in the worst environmental conditions and locations, this “non-fogging” PVT should retain functionality for much more than four years...” (quote used with permission).
- The ORNL Stress Test: At the end of a 6-month temperature cycled stress test on a full-size working RPM detector made with an EJ-200NF panel with dimensions of 2¼ in. x 14 in. x 70 in., the scintillator performance was described as “Perfect!”
- In Eljen’s own fogging tests on 60 in. bars subjected to sequential one-week cycles with temperatures varying between 55°C and -30°C at 90% relative humidity, a conventional scintillator routinely would fog badly after just one cycle, but the “NF” versions showed no loss of clarity after twenty cycles when tested both with a green laser and by “eyeball” comparison to non-stressed reference standards (see photos below).
- Eljen expects the typical useful lifetime of their “NF” plastics to be ten years.

PHOTOGRAPHS

Scintillator panels from the Eljen Fogging Test cited above: Series of 20 one-week cycles. The bars are 2 in. thick.

