3M General Offices

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Title:
3M Interam Endothermic Mat E-5A-4: Simulated Installation and Airborne Fiber Concentrations

Products:

3M Interam Endothermic Mat E-5A-4 – Aluminum Backing – 98-0400-5620-6

Discussion:
3M Interam Mat E-5A-4 was evaluated for the release of refractory ceramic fibers (CAS 142844-00-6) during the cutting and installation of the mat product. The Interam mat was subjected to three identical trials. Each mat was evaluated by cutting the mat and wrapping a long section of electrical conduit. The test was designed to represent the conditions that would be present during a typical installation in a smaller space. Each trial consisted of the removal of the mat from the packaging, cutting of the mat with utility knife, and wrapping the product around the conduit. The mat was affixed to the conduit by filament tape. This method of adhesion is common for this type of installation. The installation was conducted by two individuals. The first person was responsible for unboxing and cutting the mat into the correct size pieces. The second person was responsible for wrapping and taping the mat to the conduit. A typical field installation utilizes the same distribution of work and is often completed by a two person crew. Each trial consisted of three layers of four mat sections that covered the conduit in the pattern recommended by the manufacturer. Each trial consisted of approximately 16 cuts to the fiber mat. The matting was 24.5 inches in width. The first layer length was 19 inches. The second layer length was 22.5 inches. The third layer was 26.25 inches in length.

Air samples were collected during each trial. Samples were collected from the breathing zone of the cutter and the wrapper. Area samples were collected from a distance of 26 inches above the cutting surface. The distance from the cutting operator to the table surface was approximately 20 inches. Area samples were collected from a stationary point that was between 24 and 80 inches from the conduit being wrapped. Area samples for both cutting and wrapping were collected from the same stationary locations for each trial.

Air samples were collected in accordance with a standard NIOSH Methodology and were analyzed by a certified lab. Additionally, appropriate quality control samples were analyzed by the same lab.

The experiments and installation were conducted in a specialized exposure analysis chamber. The chamber allows for control of air flow, air exchange rates, temperature,

and humidity. See experimental and product use conditions below. Environmental variables were consistent between all three experimental repetitions.
The following table represents the results of the experiment:

Trial	Sample Type	Task	Result (Fiber/CC)	Occupational Expsoure Limit (Fiber/CC)	Severity Ratio (Result/OEL)
1	Personal	Wrap	< 0.002	0.2	< 0.01
1	Area	Cutting	< 0.002	0.2	< 0.01
1	Personal	Cutting	0.002	0.2	0.01
1	Area	Wrap	< 0.002	0.2	< 0.01
2	Personal	Wrap	0.005	0.2	0.025
2	Area	Cutting	< 0.003	0.2	<0.01
2	Personal	Cutting	0.005	0.2	0.025
2	Area	Wrap	0.005	0.2	0.025
3	Personal	Wrap	< 0.002	0.2	< 0.01
3	Area	Cutting	0.002	0.2	0.01
3	Personal	Cutting	0.007	0.2	0.035
3	Area	Wrap	< 0.002	0.2	< 0.01

For all experimental trials, the results indicated exposures less than 3.5% of the applicable occupational exposure limit. Half of the samples were below the analytical limit of detection.

Experimental and Product Use Conditions:

The sampling was performed in the 3M Environmental Exposure Chamber. This chamber is specifically designed to allow for tight control of temperature, humidity, and air exchange rates. The chamber floor was partially covered to ensure that the air was randomly moving throughout the room and to disrupt any laminar flow patterns. For all trials, the chamber was maintained a temperature of approximately 20°C, 50% relative humidity, and an air exchange rate of 4.558 air exchanges per hour. These environmental conditions are typical of those found in a smaller indoor installation space.

The chamber was first purged and then background samples were collected between trials. All background samples indicate that there was sufficient clearance between each experimental trial to remove any fibers present in the air.

As with any analysis of exposure, the local environmental conditions are strongly related to potential human exposures. If the product is used in different sized spaces, with different ventilation rates, or different air velocities the resultant exposure could be very different than what was observed in this experiment. As it is impossible to know what the exact conditions of use are, it is vital that the consumer perform their own comprehensive exposure assessment to determine risk and exposure during installation. This air sampling results are only relevant to the exact exposure scenario presented in this report and is not an acceptable substitute for a comprehensive exposure assessment.

Other product use conditions that may have in impact on human exposure during product usage include the method of cutting, differences in material handling practices, product variations, other environmental variables, multiple concurrent installations, and the amount and size of the material used during a project.

Conclusion:

For the simulated installation experiment of an installation of 3M Interam Endothermic Mat E-5A-4, the samples collected indicate that exposures were well controlled. The air samples indicated air concentrations below 3.5% of the applicable occupational exposure limit. Half of the samples collected were below the analytical limit of detection.

The exposure condition tested is representative of potential installations in small rooms or spaces. Local environmental conditions and variations in installation technique could have a significant impact on worker exposures during the installation process. In order to accurately determine risk to workers and appropriate personal protective equipment, a comprehensive exposure assessment should be completed.

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