HBAR Technologies, LLC
"*Making Antimatter Matter*"

Hazard Control Ventilation

1. Company Policy

Hbar Technologies, LLC, is committed to providing a safe work environment for all its employees. Based on the nature of the research and development work performed, exposure to atmospheric contaminants may be likely. This policy deals with the use of local exhaust systems to aid in the mitigation of a hazard.

In all work activities, exposure shall be maintained below the prescribed limits, requiring pre-planning of work, the use of local exhaust and/or dilution ventilation, and the active participation of each employee. Work planning using hazardous materials must involve a review of the Material Safety Data Sheet for the material. Hard copies of the Material Safety Data Sheets are available in the Right to Know binder located in the shop. If there are questions regarding the information contained or the Material Safety Data Sheet is missing, contact the ES&H Officer.

Compliance with the requirements is the responsibility of all affected employees of Hbar Technologies. Implementation will be coordinated by the ES&H Officer.

2. Definitions

Local exhaust systems are those systems in which contamination is contained and/or collected at the source of generation, thus preventing the contaminant from mixing within the room. Hbar Technologies has a lab hood that is an example of a local exhaust system.

In dilution ventilation, fresh air is introduced into the work area at a rate sufficient to dilute contamination to acceptable levels. Exhaust fans function in this capacity.

Exhaust surveys are conducted by the ES&H Officer to ensure the ventilation system meets the recommended criterion to ensure that atmospheric contamination remains below acceptable limits to minimize personnel exposure.

3. Procedure

Local exhaust ventilation shall adequately control the hazard for which it is being used. Control shall be deemed acceptable only if one or both of the following conditions are met:

a. The air flow performance of the system meets the requirements set forth. (Preferred)
b. The level of atmospheric contamination is known to fall below OSHA prescribed limits.

Condition a. can be satisfied by a ventilation survey. Hbar Technologies has available a KURZ Model 444 Portable Air Velocity Meter. The technical appendix to this procedure outlines the operation and care of that equipment. Results of the survey shall be documented on the form included in this procedure. Presently, the air flow requirements for the only system in use at Hbar Technologies, the fume hood, is an average air velocity in the plane of the sash of between 100-125 fpm and a minimum air velocity of 50 fpm at any point in the plane of the sash. If the equipment fails to satisfy the air flow requirements established, the unit shall be taken out of service until repairs can be made and a resurvey performed.

Condition b. can be satisfied by performing calculations utilizing information such as air flow in the work area, air exchanges, chemical and physical form of contaminant, particulate size, duration of work activity, nature of the work activity and respiratory protection afforded the employee. Such calculations will be performed by the ES&H Officer prior to the initiation of the work activity and reviewed by the President.

4. Employee Training and Information

Hbar Technologies staff will be trained in the requirements of this program and procedure relevant to one's position.

5. Records

All documentation generated by this procedure shall be maintained by the ES&H Officer for the duration of the operations of Hbar Technologies, LLC.

Employees shall be provided the opportunity to review measurement records upon request. In additions, employees will be provided the opportunity to review calculations demonstrating that the levels of contamination fall below prescribed limited upon request.

______________________________	______________________________
Elaine Marshall, ES&H Officer	Date
______________________________	______________________________
Gerald Jackson, President	Date

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TECHNICAL APPENDIX

KURZ MODEL 444 PORTABLE AIR VELOCITY METER

1.0 Introduction

The KURZ Model 444 Portable Air Velocity Meter is an easy-to-use, battery powered, highly accurate instrument for measuring air velocity for heating, ventilation, and air conditioning, industrial hygiene, occupational safety and health, and research applications. This unit can also measure static pressure and temperature.

2.0 Sensor

This unit comes with a 13-inch long "DuraFlo" velocity probe that is marked in increments of one inch. The probe also has a retractable, removable shield that can be used to increase the probe length up to 20 inches.

The basic sensing element of the meter is the probe itself. This probe consists of two integral sensors: a velocity sensor and a temperature sensor. The velocity sensor is a constant-temperature thermal anemometer which measures "standard" velocity (mass flow referenced to 25ºC and 760 mm Hg) by sensing the cooling effect of the moving stream as it passes over the heated sensor. The velocity sensor is heated electrically by the control circuitry in the electronics package. The velocity sensor is rugged and large providing some resistant to breakage and insensitivity to particulate contamination. The maximum temperature of the velocity sensor is only 75ºF above ambient temperature.

Note that the velocity readings are referenced to standard conditions. In order to obtain the actual velocity, a simple density correction may be used as provided in Equation 1. Normally this correction is small and may be neglected. In most applications, it is the mass velocity which is needed and no density calculation is required.

Equation 1: $$v_{act} = v_{ind} \times \frac{\rho_s}{\rho_a}$$

where ρ_s=air density at standard conditions
ρ_a=actual air density at local temperature and barometric pressure
v_{act}=actual air velocity in fpm
v_{ind}=indicated velocity on meter face

3.0 Operation

To check the battery voltage, turn the single, centrally located knob to "BATTERY". The meter needle should be displaced to the right of the "BATT. OK" symbol on the meter scale. If the needle fails to move this far, turn the unit range switch to "OFF". Plug the charger into the front panel receptacle labeled "CHARGER" and the other end into a wall socket.

Next, turn the range switch to the highest air velocity range position, allow the needle to return to the zero position. Loosen the knurled nut on the probe shield and slide the shield down toward the cable, exposing the sensor. Tighten the knurled nut to secure the probe shield.

Place the probe perpendicular to the air flow expected. Use lower ranges to obtain increased accuracy as low velocities. For extremely low velocities, it is recommended that the probe be firmly attached to a tripod, wall, beam or other structure to eliminate movement of the probe. Read the needle position from the appropriate scale (depends on the range switch position) and record.

If a longer reach is needed for your measurement, remove the probe shield and put it on the probe in the reversed position and slide it down the cable. Lock the shield in this position to yield an effective probe length of up to 20 inches.

4.0 Maintenance

As with all rechargeable, nickel-cadmuim battery systems, care should be taken to avoid extensive battery discharge. Care should also be taken that a repetitive, consistent cycle of partial discharge/recharge is not imparted on the battery, since this will introduce a "memory" effect.

Always slide the retractable probe shield over the sensor when the system is not in use. Store or transport the meter and probe in the foam-padded carrying case to prevent damage due to shock.

Continued use in dirty environments may necessitate periodic cleaning of the sensor. Use a small, soft brush (such as camel's hair) and clean water, followed by an alcohol rinse. The sensor should dry before resuming operation.

5.0 Calibration

Calibration should be checked periodically depending on the accuracy of the data needed and frequency of use. If it is decided to return the unit to the manufacturer, please refer to the Operating Manual for additional instructions.

The velocity calibration procedure consists of inserting the probe in a flow of known velocity and adjusting the “zero” and span controls mounted on the circuit board inside the meter. First, mechanically “zero” the meter by using the meter-zeroing screw mounted on the front panel, with the power off. Establish a “no-flow” condition in the center of a sphere three inches in diameter. Insert the probe vertically from the top until the velocity sensor is in the center of the sphere in a way that the window in the probe is perpendicular to the flow. Adjust the zero control such that the meter needle reads zero on the lowest velocity range. Adjust the span controls to obtain the full-scale readings on each of the velocity scales. The flow facility must be adjusted to give the power full-scale values for each range adjustment.

Temperature calibration must be performed after velocity is calibrated and is accomplished by inserting the probe in a calibrated temperature chamber. Adjust the temperature chamber to 0ºF. Allow for sufficient time for temperature stabilization; adjust until the meter reads 0. Next adjust the temperature bath to full scale temperature and adjust for a full-scale reading.

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VENTILATION SYSTEM SURVEY

Date of Survey: ______________________ Surveyor: ________________________________

Instrumentation: Kurz 444 Air Velocity Meter
Serial Number VP 4467

Purpose of Survey:

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____
____
____

Equipment Surveyed:

____
____
____
____

Diagram of Space Surveyed:

Average: ______________ fpm

Comments (include orientation if not obvious from diagram):

____
____
____
____

Meets Recommendations: ☐ Yes ☐ No ☐ Not applicable
If No, equipment must be taken out of service until repairs are affected.

Date of Re-Survey: ______________________ Average: _________________________ fpm