ISMI 450mm Tool ESH Review

ISMI 450mm Equipment ESH Checklist, rev. 1, 1/2009

Scope:

1. This checklist has been developed by ISMI to assist in the safe design and review of early prototype 450mm process and metrology equipment, prior to operation.

2. This checklist is to be completed by the supplier, and provided to ISMI (james.beasley@ismi.sematech.org) prior to delivery to ISMI, or equipment operation by ISMI personnel if at supplier site.

3. All early equipment is subject to Equipment Sign Off (ESO) safety review at ISMI or other sites prior to energization and operation by ISMI personnel.

4. This checklist is not a substitute for SEMI S2, SEMI S8 or other safety requirements for 450mm development and production equipment.

Instructions:

1. Complete all sections of the form. All responses of "No" will require detailed explanation. Additional information (drawings, checklists, etc.) may be attached.

2. Non-applicable sections may be marked N/A.

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Equipment Description:				
Manufacturer:		Serial #		
Form Completed by:				
Supplier	☐	Name:	Date:	
External (3rd party)	☐	Name:	Date:	
Phone #:		Email address:		
Comments:				

A. Electrical Design	Yes	No	N/A
1. Is voltage/amperage clearly marked on tool?	☐	☐	☐
2. Are there adequate provisions for grounding? Explain below	☐	☐	☐
3. Is over current protection provided? Explain below	☐	☐	☐
4. Is there a UPS (Uninterruptible Power Supply)?	☐	☐	☐
5. Does the nameplate contain all required information? (Mfg name, serial #, supply voltage, phase, frequency, full-load current.)	☐	☐	☐
6. Has Surface Current Leakage been evaluated? (< 3.5 milliamperes to ground)	☐	☐	☐
7. Are provisions for energized maintenance documented?	☐	☐	☐
8. Are all energized electrical components (>50volts) adequately shielded or protected by non-defeatable interlocks?	☐	☐	☐
9. Are there specific instructions for **Type 4** electrical work? (see SEMI S2, Electrical Design, Section 13)	☐	☐	☐
Comments:			

B. Chemicals			
1. Indicate type/amount of chemicals utilized. Explain below.	☐	☐	☐
2. Are all chemicals provided with secondary containment?	☐	☐	☐
3. Are there provisions for ensuring incompatibles are not mixed? Explain	☐	☐	☐

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Comments:			
4. Are emissions controlled by ventilation or other means? Explain below	☐	☐	☐
5. What other engineering controls are employed (such as enclosures, interlocks, ventilation, etc.) Explain below	☐	☐	☐
6. Are administrative controls (such as operational procedures, warnings, signs, etc) documented?	☐	☐	☐
Comments:			
C. Interlocks			
1. Is equipment brought to safe state when interlock is activated?	☐	☐	☐
2. Does interlock shut down all power (>24 volts) upon activation?	☐	☐	☐
3. Are they designed to minimize need to override during maintenance operations?	☐	☐	☐
4. Are they automatically restored when maintenance mode is completed? If not, explain below	☐	☐	☐
5. Are interlocks of fault-tolerant design - cannot be altered without modification or disassembly?	☐	☐	☐
6. Are interlocks hardware based and/or listed? If not, explain below.	☐	☐	☐
Comments:			
D. Emergency Shutdown			
1. Are instructions included in maintenance manual for connecting to facility interface?	☐	☐	☐
2. Does reset of EMO cause power to resume automatically? ** ***Undesired***	☐	☐	☐
3. Is EMO button red, mushroom-shaped, with yellow background?	☐	☐	☐
4. Is EMO palm operable?	☐	☐	☐
5. Is EMO clearly labeled?	☐	☐	☐
6. Is there no more than 10 feet travel distance to activate?	☐	☐	☐
7. Is it located or guarded so as to preclude accidental activation?	☐	☐	☐

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Comments:			
E. Hazard Warning Labels			
1. Do all labels conform to code requirements? See SEMI S1 Safety Guideline for Equipment Safety Labels	☐	☐	☐
2. Are labels provided to warn of all potential hazards (e.g., electrical shock, chemicals, high temperature, RF, lasers, etc)	☐	☐	☐
3. Are they durable and suitable for hazardous environments?	☐	☐	☐
Comments:			
F. Manuals			
1. Are there specific Lockout/Tagout instructions for all energy sources?	☐	☐	☐
2. Are EMO functions explained?	☐	☐	☐
Comments:			
G. Fire Protection			
1. What is the total weight of combustible materials used in the construction of and/or contained in the tool?			
2. Does the tool contain flammable liquids?	☐	☐	☐
3. What is the total weight of flammable liquids used in the construction of and/or contained in the tool?			
4. Is there a fire detection/suppression system?	☐	☐	☐
Note: Use of non-combustible FM 4910 plastic material is highly recommended for construction of equipment			
H. Heated Chemical Baths			
1. Is there a grounded or GFCI-protected heater?	☐	☐	☐
2. Does activation of the protective device(s) cause power interruption?	☐	☐	☐
3. Is there manual reset capability?	☐	☐	☐

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4. Is there a UL listed automatic temperature controller?	☐	☐	☐
5. Is there a liquid level sensor?	☐	☐	☐
6. Is there fail-safe over-temperature protection? Is it listed?	☐	☐	☐
7. Is the tool built of compatible construction materials?	☐	☐	☐
8. Is there an exhaust failure interlock?	☐	☐	☐
9. Is there over-current protection? Explain below:	☐	☐	☐
Comments:			
I. Radiation: Ionizing			
1. Are there any ionizing radiation sources? If so, list below:	☐	☐	☐
2. Will the tool achieve less than 0.2 millirems/hr during normal operations? Less than 10millirems/hr during maintenance ops?	☐	☐	☐
3. Are emergency contact phone numbers and address supplied with tool?	☐	☐	☐
4. Has a radiation survey been conducted to confirm design compliance and serve as a baseline survey? If so, please list results below:	☐	☐	☐
J. Radiation: Non-Ionizing			
1. Have all sources of potentially hazardous non-ionizing radiation been identified in maintenance manual? List below:	☐	☐	☐
2. Have warning labels been provided?	☐	☐	☐
Comments:			
K. Radiation: LASER			
1. Has CDRA laser classification been properly identified based on accessible energy during operation?	☐	☐	☐
2. Are energy (power), wavelength, and mode (continuous or pulsed) identified? List below:	☐	☐	☐
3. Does final assembly exceed Class 2 operation? If so, please explain below:	☐	☐	☐
4. Does documentation include:			
a. Description of hazards	☐	☐	☐

b. Justification of procedures requiring a laser control zone	☐	☐	☐
c. Administrative controls for maintenance/service	☐	☐	☐
d. Protective equipment description	☐	☐	☐
Comments:			
L. Sound Pressure Level (Noise)			
1. Does the design control noise levels to less than 80dbA (continuous) or 120dbA (impulse)?	☐	☐	☐
2. Has a baseline survey been conducted? List date and results below:	☐	☐	☐
Comments			
M. Ergonomics			
1. Has a baseline ergonomics assessment been conducted utilizing the SEMI S8 SESC Checklist? If so, please attach results	☐	☐	☐
Comments:			
N. Environmental Considerations			
1. Is secondary containment for liquids capable of containing 110% of volume of largest single container, or largest volume expected from single-point failure?	☐	☐	☐
2. Does design allow personnel to determine chemical levels without having to open the containers?	☐	☐	☐
3. Are chemical containers accessible and designed for easy removal of collected material?	☐	☐	☐
4. Are overfill level detectors and alarms provided?	☐	☐	☐
5. Is equipment designed to accept monitoring device signal which stops supply of chemical at first non-manual valve?	☐	☐	☐
6. Is chemical distribution system capable of automatic shutoff and remote shutdown?	☐	☐	☐
7. Does equipment use partitions, double contained lines, or similar design features to prevent mixing of incompatible waste streams?	☐	☐	☐

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Comments:			
N. Exhaust Ventilation			
1. Are exhaust flow interlocks provided?	☐	☐	☐
2. Does exhaust flow interlock require manual resetting?	☐	☐	☐
3. Is an audible alarm provided?	☐	☐	☐
4. Does alarm activation place the tool in a safe, standby mode?	☐	☐	☐
5. Has an exhaust ventilation survey been conducted? If so, please detail results below:	☐	☐	☐
Comments:			
P. Gas Detection			
1. Are internal gas detectors furnished with the tool?	☐	☐	☐
2. Can the detectors be interfaced with the facilities alarm system?	☐	☐	☐
3. Are there provisions for emergency backup power for detectors?	☐	☐	☐
4. Does gas detection above a threshold limit initiate tool shutdown or place tool into safe state?	☐	☐	☐
Comments:			