DEPARTMENT OF MECHANICAL ENGINEERING

Name of SOP	Latent Heat Thermal Storage rig
Effective Date	May. 01, 2014
Author	David Nakhla
Reason for SOP	Risk of burn Risk of electrical shock Risk of fire
Approved by (supervisor)	Dr. J.S. Cotton
Date reviewed by (JHSC)	July 09, 2014

Definitions

Terms	
Acronyms	RMM – Risk Management Manual JHSC - Joint Health and Safety Committee EOHSS - Environmental Occupational Health & Safety Service PCM-Phase Change Material EHD- Electrohydrodynamics MSDS-Material Safety Data Sheet

Requirements

Applicable OHSA regulations and / or codes of practice.

1. OHSA code.
2. McMaster University Risk Management Policies

Description of the Task

Location and time of work	JHE 106 B, as required by testing needs
Individuals and skills required	WHIMIS training Electrical operation of equipment
Equipment and supplies required	1. 120 VAC Variac 2. Gullco Electrode Stabilizing Oven 3. Trek High voltage power supply (model 20/20c) 4. Agillent DC power supply6655A 5. Grounding rod 6. Data acquisition computer 7. Acrylic test section 8. Oscilloscope 9. Function generator
Personal protective equipment required	1. Heat Resistant Gloves (For Handling hot PCM) 2. Safety goggles (To protect from any possible splashing while handling the PCM)

Sequential steps to complete the work safely.
General Safety instructions

1. All users must obey the safety instructions and warnings posted around the workspace.
2. The operator should only access the test facility work area.
3. The operator must read the MSDS for the PCM material before handling
4. The operator must wear the heat resistant gloves and the safety googles before handling the PCM from the oven
5. Make sure that the temperature of the oven is not set over 90 ˚ C or the flash point of the PCM. [Flash

point of paraffin wax is 190 ˚C. Check MSDS if other material is used]

6. The operator should not touch the test section before turning off the Trek high voltage power supply.
7. Access to the space between the thermal storage rig and the EHD refrigerant experimental rig is prohibited while test is running. [Make sure that the warning sign is put every time the rig is operating]
8. Make sure that the temperature of the acrylic test section doesn't exceed 120 ˚C [acrylic melting temperature] during any Test, if it goes higher than that, turn of the Agillent DC power supply and the high voltage power supply sequentially.
9. In case of fire situation caused by accidental melting of acrylic or burning of the PCM in the oven, turn off all electrical equipment and use the fire extinguisher placed at the main entrance door.
10. The operator should monitor the current from the oscilloscope. In case of any noticeable increase in the output current, turn off the function generator then the high voltage supply.
11. Turn off the function generator in case of any sudden increase in the output current.
12. Use the grounded rod to discharge any accumulated charges on the electrode before changing any connections

Specific Instructions for the operation of the Trek High Voltage Amplifier

1. Make sure that the controller of the high voltage power supply is at the zero volts
2. Turn on the high voltage power supply , closely monitor the current
3. Make sure that the high voltage power supply is turned off after the experiment

Contingency Plan and Reporting

Accident / injury response

1. Apply first aid as required. [Refer to the MSDS for the PCM]
2. Notify Mechanical Engineering technical staff immediately
3. For all injuries complete a "Injury/Incident Report" and provide a copy to the Chair and EOHSS
4. In case of critical injury call security (dial 88, cell 905-522-4135).
5. In case of critical injury notify EOHSS immediately, ext. 24352

Spill response

1. Refer to PCM MSDS sheet

Equipment shutdowns.

1. Turn off the high voltage power supply
2. Turn of the DC power supply
3. Turn off the oven.

Environmental Responsibility

Waste disposal procedures

No waste is produced during normal operation. In case of any spillage, allow the material to cool and solidify and then recover and place into appropriate containers for disposal.

References (OHSA/ regulations, EPA and Municipal environmental regulations, McMaster University Program/ Policy, Material Data Sheets (MSDS).

1. RMM Policy #300 Safety Orientation and Training Program
2. RMM Policy #301 Standard Operating Procedure
3. RMM Policy #309 Laboratory Safety Manual
4. RMM Policy #316 Electrical Safety Program
5. RMM Policy #1000 Reporting and Investigating Injury, Incidents and Occupational Disease

Distribution

1. Supervisor
2. Trained lab operator
3. Technical Staff of Mechanical Engineering
4. Faculty of Engineering JHSC