

Name of SOP	Silica Sand (for more details on silica sand see to the Designated Substance Form of this material)
Effective Date	August 20, 2014
Author	Jeyakumar Manickaraj
Reason for SOP Safety of the operator and people around	<p>Check All that Apply:</p> <p><input type="checkbox"/> Procedure/Process could cause critical injury.</p> <p><input checked="" type="checkbox"/> Procedure/Process could cause occupational illness.</p> <p><input type="checkbox"/> Procedure/Process could cause environmental impairment.</p> <p><input type="checkbox"/> Procedure/Process could damage University property.</p> <p><input type="checkbox"/> Supervisor's discretion.</p> <p>Provide Details:</p> <p>Occupational exposures to respirable crystalline silica are associated with adverse health effects.</p>
Approved by (supervisor)	Dr. Sumanth Shankar
Date reviewed by JHSC	14 January 2015

Definitions

Terms	none
Acronyms	RMM – Risk Management Manual JHSC - Joint Health and Safety Committee EOHSS - Environmental and Occupational Health Support Services EPA – Environmental Protection Act OHSA – Occupational Health and Safety Act

Requirements

Applicable OSHA regulations and / or codes of practice. 1. RMM #101 - McMaster University Risk Management System
Training and Competency 1. Training provided by Light Metal Casting Research Center LMCRC. 2. Respiratory fitting test. 3. Respiratory use and protection training. 4. Competency is shown by the individual after training.

Description of the Task

Location and time of work	JHE 101, working days.
Individuals involved	Graduate Students and PDFs.
Equipment and supplies required	Mixer (located in JHE 101 lab, shown in Figure 1), buckets, plastic bags.
Personal protective equipment required	Mask (3M, Half Facepiece 6200/07025 with 3M P100 Particulate filter), leather gloves, coverall, head cover, safety glasses.

Sequential Steps to Complete the Work Safely

General safety instructions

1. Read the MSDS for silica sand.
2. Wear personal protective equipment mentioned above (starting with mask) while mixing silica sand with water.
3. Do not open bags of silica sand in the lab.
4. Keep bags of silica sand closed all the time.
5. Store bags of silica sand in plastic bags each.
6. Use cart to transport silica sand bags.
7. Do not touch the mixer during mixing.
8. Keep the work area and surfaces clean.
9. Do not insert any object into the mixer while mixer is on.
10. No eating, smoking, drinking or chewing near the working place.
11. Wash hands after the shift where dry silica sand is being mixed with water.
12. Do not touch contaminated clothing and equipment with bare hands.

Part I: Mixing Procedure

1. Wear personal protective equipment (starting with mask, overall, head cover, glasses, leather gloves).
2. Transfer the silica sand bag using a cart to the open space at the loading area at the back of JHE building.
3. Two persons should be available for the mixing process. One to perform the process, the other to restrict access to the mixing area during the mixing process.
4. Open the bag from top slowly and carefully.
5. The person working with sand has to cover himself with appropriate protective layer and mask. Pour sand into bucket by a small laminar stream with no turbulence or dissipation and add proper amount of water; same amount as in the cast mould (6%).
6. Close the bag properly using round plastic clamps.
7. Shake the bag thoroughly in order to homogeneously mix the contents.
8. Place the bag on the cart.
9. Remove silica dust on personal protective clothing and equipment by wiping. Take off the safety equipments, double bag them in plastic bags and close the bags properly. This bag is not opened at the lab when the safety equipments are to be re-used. These clothes should not be worn elsewhere and should be handled with care to prevent disturbing the silica dust.
10. Return the wet silica sand using the cart to the working location at the lab.
11. Wear personal protective equipment (other than the ones used in point 1 above) when mixing the wet silica sand with the other components of the cast mould.
12. Clean up the work area and equipment after each operation to prevent dust silica from spreading. Clean all surfaces and the floor by wet sweeping. Do not use compressed air or dry sweep for cleaning up.
13. Wash hands after the mixing shift.
14. Used sand after each test is stored in closed buckets. When the bucket is full it is sealed and sent to Canmet for disposal.
15. When mixing silica sand with water again, same procedure is repeated. However, personal protective equipment should be worn starting with the mask.

Part I: Use of Silica after mixing

After the Silica sand is mixed with water, other components will be added to the mixture to form a sand mould with a binder system. The moulds are then baked in a furnace. After that silica will not be in a loose powder form but in rigid moulds. After pouring the metal, the moulds will be removed by water and silica becomes wet again. It is stored while being wet in closed buckets and sent to Canmet for final disposal.

Contingency Plan and Reporting

Equipment Malfunction

For any malfunction in the mixer, cut off the power supply and lock out the equipment. Inform supervisor.

Equipment shutdowns

Switch OFF the mixer and remove the power supply

Accident / injury response

In the event of dry silica bag was damaged during transportation or storage, immediately cover it with a plastic cover and the area is evacuated. Call mechanical engineering technical staff for directions and assistance. Wear personal protective equipment listed above, wet the sand and sweep it to a container. Close the container and store for disposal.

In the Case of Critical Injuries

Cut off the power supply to the mixer and lock out the equipment, first aid kit is used if necessary, emergency services called and accident is reported.

1. Immediately arrange for medical and emergency assistance by calling Security at ext. "88".
2. Notify Technical Staff immediately. Ext. 24628

Environmental Responsibility

Waste disposal procedures

Used moulds are stored in closed and sealed buckets and transferred to Canmet for disposal. Canmet has certain procedures for disposal of silica sand.

Building air quality

Procedure is not expected to affect air quality. Mixing silica sand with water takes place outside of the building. Moreover, mixing is expected to be done only once a month.

References

1. OHSA/ regulations
2. EPA and Municipal environmental regulations
3. RMM #100 McMaster University Environmental Health and Safety Policy
4. Material Safety Data Sheets (MSDS)
5. RMM #300 Safety Orientation and Training Program
6. RMM #301 Standard Operating Procedures
7. RMM #304 Persons Working Alone
8. RMM #309 Laboratory Safety Manual
9. RMM #310 Eye Protection Program

Distribution

1. Faculty of Engineering JHSC (for review)
2. Technical Staff of Mechanical Engineering JHE 205 ext. 24628



Figure 1: Kitchen Aid mixer, NSF, 7 QT, 1.3 HP, with Speed control protection, safety guard and all-metal gears and housings. Mixer is located at JHE 101 lab on a working table.