

Department of Civil Engineering

Name of SOP	Cutting Torch
Effective Date	October 2007
Author	Bernard Nieuwenhuis, Paul Heerema
Reason for SOP	Risk of eye damage Risk of severe burn Risk of fire
Approved by (supervisor)	
Date reviewed by JHSC	

Definitions

Terms	
Acronyms	RMM – Risk Management Manual JHSC - Joint Health and Safety Committee EOHSS - Environmental Occupational Health & Safety Service MAPP - methylacetylene-propadiene OXY- Oxygen gas

Requirements

Applicable OHS regulations and / or codes of practice.
<ol style="list-style-type: none"> 1. McMaster University Risk Management Policies 2. OHS code
Training and Competency
<ol style="list-style-type: none"> 1. Training provided by technical staff 2. Competency is shown by individual after training

Description of the Task

Location and time of work	ADL-Main Floor, during normal working hours
Individuals and skills required	Technical staff, Graduate students with proper training
Equipment and supplies required	Torch cart – includes: Oxygen and methylacetylene-propadiene gas cylinders, torch with hoses connecting to both gas cylinders, pressure regulator attached in line with the hoses - typically affixed to the top of the MAPP gas cylinders.
Personal protective equipment required	Flame cutting goggles Steel Toe Boots Welding gloves, welding jacket and long pants

Department of Civil Engineering

All students must be trained by a technician and show competency before use.

Cylinder Conditions

1. Temperature of the cylinder contents *must not* be allowed to exceed 55°C (Note: Hot gases expand and may increase pressure above allowable limits). Hose lengths will allow user to move cylinders an appropriate distance from cutting location to prevent overheating.
2. Cylinders showing damage, corrosion, or fire exposure *must not* be used.
3. Cylinders *must* only be used with a pressure-regulating device
4. Cutting torch must be used in such a way that the gas supply hoses are not in direct contact or close proximity to cutting flame.

Fire and Explosions

Cutting torch operations can produce intense heat. Steel melts at approximately 3000 degrees Fahrenheit, thus temperatures in excess of this are possible and special precautions need to be taken to prevent deadly fires and explosions.

1. Never use the torch in an explosive atmosphere. If you suspect the presence of a gas present in the torching area before you begin, contact management to have it checked out before proceeding with any work.
2. Never use the torch near stored ignitable materials or combustible debris.
3. Never use the torch on a pressure vessel of any sort, an explosive release of gases and possible combustion of gases will result.
4. When using the torch at a higher elevation, take precautions for falling sparks you produce.
5. Always have adequate fire extinguishing equipment immediately available where you are welding.
6. If necessary, have additional personnel stand fire watch while work is being performed.

Hazardous Fumes:

1. Using the cutting torch for galvanized steel is very dangerous to one's health; the galvanized coating is comprised of a zinc component and this is very bad to breathe in – it can cause serious health problems. Appropriate ventilation is required. It is recommended that cutting be done outside where possible when galvanized steel needs to be cut.

Sequential steps to complete the work safely.

Eye protection (flame cutting goggles) is mandatory for all employees using the torch. Do not use the torch in explosive atmospheres or around combustible materials. Other rules relating to the use of high-pressure gas bottles include:

1. Before starting a torch project, the operator shall inspect the equipment. The hoses, valves, couplings, and tip connections shall be checked for damage and leaks.
2. During transportation, storage, or when in use, a compressed gas cylinder must always be secured in an upright position. This is especially important for MAPP bottles, because the acetone in them can corrode the valve assembly if laid on its side.
3. Full or empty gas cylinders not in use shall have their valves shut and the valve protection cap screwed on.
4. Never use high pressure compressed oxygen in a cylinder for ventilation, comfort cooling, blowing dust from clothing, or cleaning your work area. Pure oxygen greatly enhances the combustibility of any fuel and accelerates the burning process.
5. Take extra caution with oxygen bottles to see that the valve assembly on top is not damaged by equipment or a fall. The very high pressure of the escaping oxygen in the cylinder will propel it like a torpedo and destroy most anything in its path.
6. When lifting cylinders with a rig, never wrap a choker or sling directly on the cylinder. Always

Department of Civil Engineering

secure them in a cart, cradle, sling board, etc., for hoisting. Also, do not use the valve protection cap for hoisting.

7. Oxygen cylinders must have their valve opened all the way for use.
8. MAPP valves, however, must be opened not more than 1½ turns so they can be quickly turned off in an emergency.
9. Torches will be lit by strikers or friction lighters, not with matches.

BASIC RULES FOR OXY-MAPP CUTTING

1. Release the adjusting screw on the regulator before opening the cylinder valve.
2. Stand to one side of regulator before you open the cylinder valve.
3. Open cylinder valve slowly.
4. Do not use or compress MAPP in a free state at pressures more than 15 psig.
5. Purge your MAPP gas and oxygen passages individually before lighting the torch.
6. Light the MAPP gas before opening the oxygen on the torch.
7. Do not use oxygen as a substitute for air.
8. Keep your work area clear of all flammables.

Lighting sequence

1. Inspect the hoses, valves, couplings, and tip connections for damage and leaks
2. Open MAPP gas adjustment screw on handle
3. Open valve on MAPP gas cylinder
4. Close MAPP gas adjustment screw on handle
5. Open oxygen adjustment screw on handle
6. Open valve on oxygen cylinder
7. Close oxygen adjustment screw on handle
8. Open MAPP gas adjustment screw on handle ½ turn
9. Light gas with flint.
10. Open oxygen adjustment screw on handle until desired flame size is achieved

Extinguish sequence

1. Close valve on MAPP gas cylinder
2. Close MAPP gas adjustment screw on handle
3. Close valve on oxygen cylinder
4. Close oxygen adjustment screw on handle
5. Move torch back to tool room

Contingency Plan and Reporting

Accident / injury response

1. Apply first aid as required
2. Notify Civil Engineering staff immediately
3. For all injuries, complete an "Injury/Incident Report" and provide a copy to the Chair and to EOHSS.
4. In case of critical injury, call security (dial 88)
5. In case of critical injury notify EOHSS immediately, ext 24352.

Equipment Malfunction

1. If able, close the valve on MAPP gas cylinder.
2. If able, close the valve on the Oxygen gas cylinder.
3. Assess fire situation of cutting being performed when malfunction occurred, take necessary fire extinguishing steps as necessary or able.

Department of Civil Engineering

4. Notify Civil Engineering staff immediately, especially if unable to complete steps 1,2 or 3.

Equipment shutdowns

1. Close fuel valve
2. Close oxygen valve
3. Wait until oxygen and fuel gas has been discharged
4. Close the fuel gas valve on the torch handle

Environmental Responsibility

Waste disposal procedures

1. No appreciable waste generated. Metal scraps from cutting procedure can be disposed of in appropriate metal recycling.

Building air quality

1. Turn on air extraction and circulation unit if using the cutting torch inside. If work can be done outside this is generally preferred for greater ventilation and decreased fire risk.

References

1. OSHA/ regulations
2. EPA and Municipal environmental regulations
3. McMaster University Program/ Policy
4. Material Data Sheets (MSDS)
5. RMM #300 Safety Orientation and Training Program
6. RMM #301 Standard Operating Procedure
7. RMM program #309 Laboratory Safety Manual
8. RMM program #310 Eye Protection.
9. RMM program #403 Noise Control and Hearing Preservation
10. RMM program #1000 Reporting and Investigating Injury, Incidents and Occupational

Distribution

1. Laboratory safety binder
2. Technical Staff of Civil Engineering
3. Civil Engineering Safety Committee
4. Civil Engineering Chair
5. Faculty of Engineering JHSC