

GMD Training Supplement:

Laboratory Hazards



January 2015

Scope

General safety awareness training is provided by the NOAA Safety and Environment Compliance Office (SECO). <http://www.seco.noaa.gov/>

This module provides supplemental information related to specific laboratory hazards within GMD not covered in the SECO training.

This training is required for all GMD staff.

Contents of this Training

1. Laboratory Hazards (general)
2. DSRC Chemical Hygiene Plan
3. Laboratory Chemicals and Storage
4. Compressed Gas Cylinders
5. Cryogenics
6. Electrical Hazards
7. Additional Hazards and Safety Training Needs
8. Training Credit

Laboratory Hazards

Each GMD laboratory has been assessed for laboratory hazards by the GMD safety committee.

Employees working in laboratories should be familiar with specific hazards associated with the laboratories in which they work.

Employees are encouraged to bring additional hazards not identified in the laboratory assessments to the attention of the GMD safety officer.

Chemical Hygiene Plan

The DSRC Chemical Hygiene Plan (CHP) describes practices and procedures to protect employees from exposure to chemical and physical hazards within DSRC. The CHP is available at:

<http://www.esrl.noaa.gov/csd/safety/chemicalhygieneplan.pdf>

Employees should be familiar with the CHP such that they can:

- a. Plan and conduct each activity in accordance with chemical hygiene procedures.
- b. Use prudent laboratory practices detailed in the document and develop good personal chemical hygiene habits.
- c. Communicating concerns to the Project leader, Group Chief and/or the CHO (ASR).

Chemical Safety

General Considerations when Working with Chemicals:

- 1) Know the hazards. Consult the MSDS if you do not know the nature of the chemical.
- 2) Assume the chemical is hazardous unless known otherwise.
- 3) Minimize chemical exposures. Use prudent lab practices to minimize exposures.
 - Prevent contact with chemicals through the use of appropriate personal protective equipment.
 - Never pipet or siphon by mouth
 - Do not smell or taste chemicals
 - Vent toxic discharges from equipment into local exhaust system
 - Use minimum volumes/concentrations
 - wear lab goggles for splash protection
- 4) Do not eat, drink or smoke in the laboratories and adjacent areas. Food or drinks must not be stored in any manner in which they could come in contact with toxic materials.
- 5) Wear suitable clothing (lab coat, closed toe shoes): NO SANDALS
- 6) Do not work alone when handling hazardous chemicals (do not work when the building is unoccupied)

Chemical Safety

General Considerations when Working with Chemicals (continued):

- 7) Use the fume hood: The rule of thumb is that any chemical with an exposure limit of 50 ppm or less should be used in a hood.
- 8) Keep materials stored in hood to a minimum & do not block air flow through back slots.
- 9) If equipment containing hazardous chemicals must be left running after hours, post a sign with: the date, your name, and phone number for contact in case of an emergency.
- 10) Provide for containment of hazardous chemical in the event of a power failure.
- 11) Follow established waste disposal procedures as provided by NIST.
- 12) Be familiar with (and don't block access to) emergency equipment (safety showers, eyewashes, fire extinguisher, spill kits etc.) and first aid procedures:
 - Eye contact: Promptly flush eyes with water for approximately 15 minutes, call for assistance, continue to flush eyes with isotonic solution while seeking medical attention.
 - Ingestion: Follow procedures per Material Safety Data Sheet. Seek medical attention.
 - Skin contact: Promptly flush affected area with water and remove any contaminated clothing. If symptoms persist after washing, seek medical attention.
 - Inhalation: Remove to fresh air. Seek medical attention.

Chemical Safety

In the event that air concentrations could exceed OSHA exposure limits while you are handling chemicals, contact the GMD safety officer for air monitoring options.

OSHA publishes limits for occupational exposure to chemicals in the air.

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=9992

TABLE Z-1. - LIMITS FOR AIR CONTAMINANTS

Substance	CAS No. (c)	ppm (a)(1)	mg/m(3) (b)(1)	Skin designation
Acetaldehyde.....	75-07-0	200	360	
Acetic acid.....	64-19-7	10	25	
Acetic anhydride.....	108-24-7	5	20	
Acetone.....	67-64-1	1000	2400	
Acetonitrile.....	75-05-8	40	70	
2-Acetylaminofluorene; see 1910.1014.....	53-96-3			
Acetylene dichloride; see 1,2-Dichloroethylene.				

Chemical Storage

Consult the MSDS for storage considerations.

For compatibility to store chemical together, this free program might be useful.

<http://response.restoration.noaa.gov/chemaids/react.html>

Hazard Summary	Potential Gases	Pot. Gases Documentation	General Documentat
Selected Chemical Combination +	NITRATING ACID, MIXTURE, (WITH <= 50% NITRIC ACID)		
	SODA LIME, WITH MORE THAN 4% SODIUM HYDROXIDE		
A6 - Reaction proceeds with explosive violence and/or forms explosive products			
B1 - May become highly flammable or may initiate a fire, especially if other combustible materials are present			
C - Exothermic reaction. May generate heat and/or cause pressurization			
D6 - Exothermic, generation of toxic and corrosive fumes			

Chemical Storage

Storage Issues: General

- Chemicals maintained in the laboratories should be properly stored when not in use. Containers should be kept closed and properly segregated in storage cabinets
- Carcinogens should be stored in ventilated cabinets.
- All corrosives must be stored at eye level or lower. Hazardous materials in suitable plastic containers can be stored above eye level if necessary, although it is preferred that they be stored at a lower level.
- Acids and bases must be stored separately.
- Secondary containment (to catch leaks) is recommended (e.g. store liquids in a plastic tub).
 - some storage cabinets have built-in secondary containment

Chemical Storage

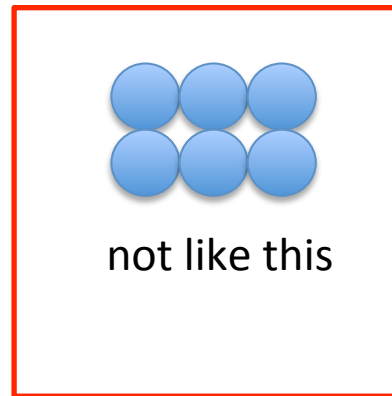
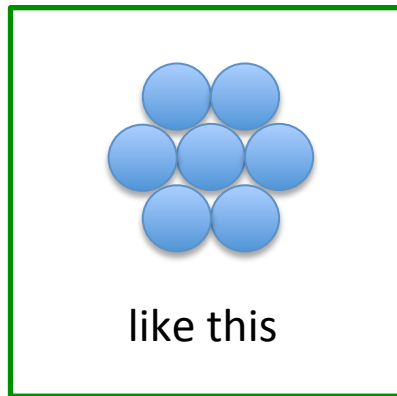
Storage Issues: Flammables

- Flammable and combustible liquids may be stored in plastic, glass or metal containers of various sizes depending on the class of liquid. In general, a glass or plastic container up to 1 gallon in size or a metal safety can up to 5 gallons in size may be used to store flammable and corrosive liquids.
- EXCEPTION 1: Flammables with a flash point of less than 73 F and a boiling point less than 100 F must be stored in a plastic or glass container no larger than 1 pint or a safety can no larger than 2 gallons.
- EXCEPTION 2: Flammables with a flash point of less than 73 F and a boiling point greater than or equal to 100 F may be stored in a plastic or glass container up to one quart in size or a 5 gallon safety can.
- Cabinets containing flammables should be clearly marked:



Compressed Gases

- Be familiar with the proper operation of gas cylinder valves and CGA-fittings.
- Always use a hand-truck to move cylinders.
- Store cylinders with caps ON whenever possible.
- Store cylinders in a secure fashion: anchored to walls or immovable objects.
- Cylinders may be stored in securely-wrapped bundles on a temporary basis.
 - in this case, cylinders should follow the 3-point contact rule.



- Cylinder contents must be identified by a label.
- Flammable gases should be stored away from oxidizers and heat/spark/flame..
- Cylinders should not be stored near heat sources.

Compressed Gases

Be familiar with label and DOT markings on cylinders.

Observe pressure limits and DOT test dates.

WHAT TYPES OF MARKINGS APPEAR ON UN PRESSURE RECEPTACLES?

TOP ROW

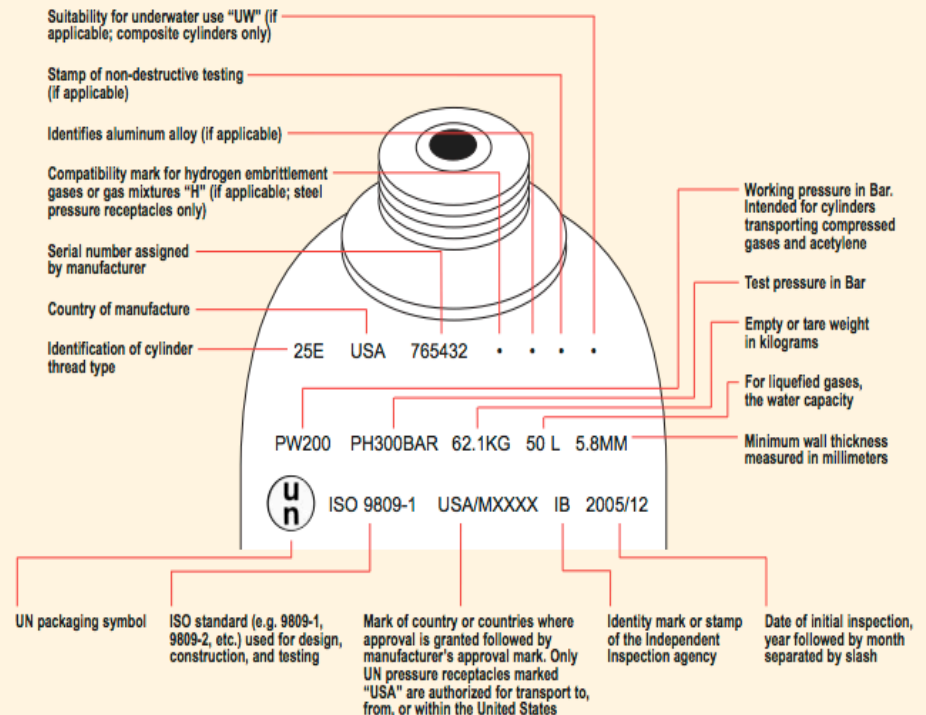
Contains manufacturing marks such as the cylinder thread type, the country of manufacture, and the serial number assigned by the manufacturer.

MIDDLE ROW

Contains operational marks such as the test pressure, the tare or empty weight, and the minimum wall thickness.

BOTTOM ROW

Contains certification marks such as the UN packaging symbol, the ISO standard, the country or countries of approval, and the manufacturer's approval mark.



Other markings are permitted in other low stress areas provided they are not on the side wall.
Other markings must not conflict with the required markings.

Cryogenics: Liquid Nitrogen and Dry Ice

General Precautions:

- Avoid eye or skin contact with these substances.
- Never handle dry ice or LN2 with bare hands.
- Use cryogenic gloves
- Cryogenic gloves need to be loose-fitting so that they can be readily removed if LN2 splashes into them or a piece of dry ice falls into them.
- Always use appropriate eye protection.
- Do not use or store dry ice or LN2 in confined areas, walk-in refrigerators, environmental chambers or rooms without ventilation. A leak in such an area could cause an oxygen-deficient atmosphere.
- Never place a cryogen on tile or laminated counters because the adhesive will be destroyed.
- Never store a cryogen in a sealed, airtight container at a temperature above the boiling point of the cryogen; the pressure resulting from the production of gaseous carbon dioxide or nitrogen may lead to an explosion.

Cryogenics: Liquid Nitrogen and Dry Ice

General Precautions (continued):

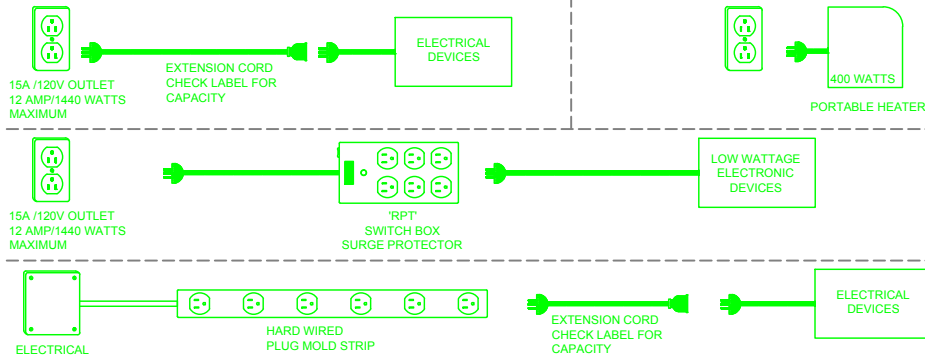
- When using LN₂, be careful not to expose open containers of LN₂ to the room for extended periods. Liquid oxygen can accumulate in the dewar, resulting in an explosion hazard if fuels are present, including grease and oils.
- In case of exposure to cryogenics or dry ice:
 - remove any clothing that is not frozen to the skin.
 - Do NOT rub frozen body parts because tissue damage may result.
 - Obtain medical assistance as soon as possible.
 - Place the affected part of the body in a warm water bath (not above 40°C).
 - NEVER use dry heat.

Electrical Safety

Extension cords

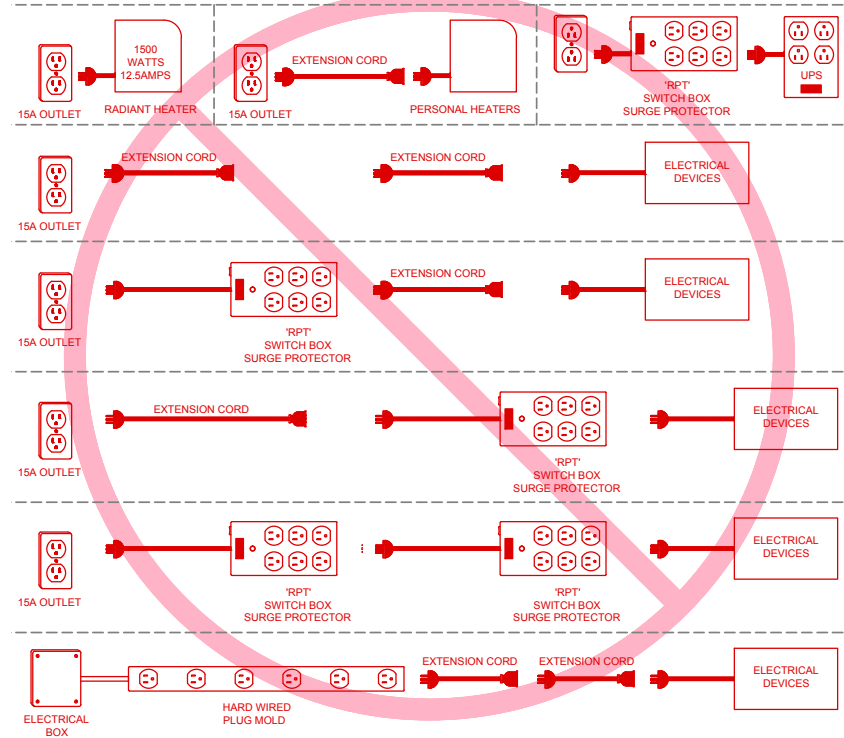
- may be used on a temporary basis (< 90 days)
- Extension cords cannot be run through walls or windows
- extension cords and power strips must not be daisy-chained in series

ACCEPTABLE COMBINATIONS OF EXTENSION CORDS & RPTS



NOTE: HIGH AMPERAGE DEVICES, SUCH AS HEATERS, SHALL BE PLUGGED DIRECTLY INTO A WALL OUTLET

UNACCEPTABLE (DAISY CHAIN) COMBINATIONS OF EXTENSION CORDS & RPTS



Some Examples of Other Training Needs

Aircraft Work – Aircraft safety will be addressed separately.

For employees working with aircraft, please see GMD safety officer.

Hazmat Shipping – Proper shipping (road and air) practices will be addressed separately.

For employees shipping hazmat materials, please see GMD safety officer.

Ionizing Radiation – Radiation safety is addressed separately.

For employees working with radioactive materials, please consult the GMD internal web pages:

<https://intranet.cmdl.noaa.gov/doku.php?id=safety>

Laser Safety – Laser safety is addressed separately.

For employees working with lasers, please see documents stored on the following drive:

[\\emc3\safety\Laser Safety](#) (only available from windows machines)

Tower Climbing – Safe tower climbing practices will be addressed separately.

For employees working with towers, please see GMD safety officer.

Training Credit

Please Email Chris Cornwall to receive credit for viewing this presentation,

“GMD Safety Supplement 2015”:

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Thank you for your time!