The following information is specific to a 'Laboratory' space type and is in addition to all previously stated standards listed in Divisions 01 – 33.

Laboratory Definitions

1. OSHA 1910.1450(b) *Laboratory*: A facility where the laboratory use of hazardous chemicals occurs. It is a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis.
2. OSHA 1910.1450(b) *Laboratory Scale*: Work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safely manipulated by one person. 'Laboratory scale' excludes those workplaces whose function is to product commercial quantities of materials.
3. Laboratory Ventilation:
    a. 29 CFR 1910.106(d)(4)(iv) *Ventilation*: "Every inside storage room shall be provided with either a gravity or a mechanical exhaust ventilation system. Such system shall be designed to provide for a complete change of air within the room at least 6 times per hour."
    b. 29 CFR 1910, Appendix A; NRC recommendations for chemical hygiene in labs (C)(4)(f): *Performance:* Rate: of 4-12 room air changes / hours is normally adequate general ventilation if local exhaust systems such as hoods are used as the primary method of control (194)."
    c. NFPA 45, 2004: Standard on Fire Protection for Laboratories Using Chemicals: Minimum 4 ACH unoccupied occupied typically greater than 8 ACH."
4. Oregon 2007 Fire Code, Hazardous Materials:
    a. 2704.3 *Ventilation*: "Indoor storage areas and storage buildings shall be provided with mechanical exhaust ventilation or natural ventilation where natural ventilation can be shown to be acceptable for the materials as stored."
    b. 2704.3.1(2): "Mechanical ventilation shall be at a rate of not less than 1 cubic foot per minute per square foot [0.00508 m3/(s•m2)] of floor area over the storage area."
    c. 2705.1.9 *Ventilation*: Indoor dispensing and use areas shall be provided with exhaust ventilation in accordance with Section 2704.3."
5. Oregon 2007 Mechanical Code, Table 403.3: "Required outdoor ventilation air, Educational Laboratories, 20 cfm per person, 30 person maximum occupant load per 1000sf."

Laboratory ADA Guidelines

Accessibility and ADA Compliance in Research Laboratories at the University of Oregon
F.Tepfer 22 March 2011

'The UO strives to create accessible, welcoming working and learning environments, a key part of which is accessible research labs. The UO has long been a leader in this area as with other aspects of accessibility.

The challenge in making accessible work environments is to build facilities that work well for everyone's abilities and yet adapt still further to the widest range of disabilities that we encounter, some of which are covered under the ADA. Conventional catalogue choices for accessibility, the ones with the little blue wheelchair symbol, are often ineffective or even dangerous for those without disabilities. The Hamilton HOPEC fume hood is one such example. We take a different approach that is more effective for all users and results in an environment that looks and feels more universally welcoming.

The basic premise of UO's accessible lab design is to ensure that the permanent elements either are already accessible to Federal standards or can be adapted to be accessible on reasonably short notice. Our position is that a week's notice is reasonable for making minor changes to a research lab environment. In some cases, this requires modest compromises in the design compares to inaccessible solutions, but in most cases, we have developed methods that can easily be adapted for the whole population on short notice.

Laboratory ADA Guidelines continued

These principles were developed over many years of providing access to researchers, including individuals confined to wheelchairs, others who use other mobility aids, some who were blind, and others with moderate to severe deafness. Our track record has kept us ahead of federal and state requirements for accessibility.

1. As required by the ADA Standards and by state code, the built structure of walls and doors is fully compliant with the latest ADA Standards as strengthened to comply with UO Universal Access policies. This generally results in a level of accessibility beyond Oregon code. The UO-modified ADA Standards can be found at http://uplan.uoregon.edu/plandoc/OregonizedADA.html.
2. The deafness provisions of the ADA Standards and Oregon code are to be provided in full, and provisions for blindness are provided into all circulation areas within the lab.
3. The most challenging research lab elements to modify, generally involving research equipment such as fume hoods and lab benches, are built to be accessible or adaptable on reasonable notice for a reasonable number of stations, generally one per lab suite or 10% (whichever is more). In particular:
    - Lab benches generally have countertops no higher than 34 inches or are vertically adjustable from 29 inches to 36 inches.
    - Safety showers, eyewashes, fire extinguishers, and other safety-related devices are accessible or could be modified to be accessible on short notice.
    - We consider lab benches to be furniture in a workplace, but we still take measures in advance to assure that a reasonable number or work stations in our generic research labs can be made accessible. If no stations in the lab suite have vertical adjustability with mobile base units, knees space is provided or could be created by removing cabinet boxes, after which a reasonable number of stations will be accessible.
    - A reasonable number of fume hood base cabinets can be removed to provide knee space, after which basic hood functionality is accessible.
    - A reasonable amount of storage is within reach range or could be made accessible on short notice.
4. Some elements are not made accessible initially or in some cases ever.
    - As mentioned above, lab benches may or may not be accessible at the outset but a reasonable number can be modified to accommodate a wide range of individuals.
    - The same applies to fume hoods.
    - Sink depth is usually non-compliant, as a safe sink for ambulatory users is generally deeper than a compliant sink. Sinks will be changed as needed in the future to ADA-compliant sinks.
    - Specific pieces of research equipment such as centrifuges, electron microscopes, mass spectrometers, and so forth are unlikely to be accessible or to be adaptable, but other methods such as a lab assistant would be used to ensure access to the services.

We recognize that acceptance of this approach for code compliance requires some degree of trust of the UO to be responsive when necessary. Federal requirements to accommodate individuals with disabilities put our Federal research grant support at stake should we not comply when needed, providing us with an incentive and providing the City of Eugene with some confidence that our assurances about adaptability are not empty promises.'

U of O Laboratory Types

1. Individual labs may vary from these models in level of risk, materials and systems, and other respects. Labs are expected to be generic within large categories to allow flexibility of future assignment:
    a. Bioscience: moderate chemical use; moderate radioactivity use; significant use of carcinogens, toxics, mutagens.
    b. Synthesis chemistry: high chemical use; high flammable solvent use; high corrosive use; high gas use.
    c. Analytical chemistry: low or moderate chemical use.
    d. Optics: low or moderate chemical use.
    e. Physics: low or moderate chemical use; high cryogen use.

U of O Laboratory Types continued

f. Human Physiology: low or moderate chemical use.
g. Animal Research: low or moderate chemical use; significant use of carcinogens, toxics, mutagens.
h. Geological sciences: low or moderate chemical use; moderate corrosive use; moderate flammable gas use.
i. Anthropology: low or moderate chemical use.
j. Fine arts studios, painting, printmaking, photo labs, etc.: moderate to high chemical use (low diversity and high volumes)
k. 4 ACH (Air Changes per Hour) when unoccupied and greater than 8 ACH when occupied appear to be common standards for laboratory ventilation. UO laboratory standards do store hazardous material in quantities above Maximum Allowable Quantities (MAQ) per control area and as such could be interpreted as regulated to storage room standards of a minimum 6 Ach or 1 cfm/ ft² storage area, whichever is greater.

Space planning & General Items

1. B occupancies only.
2. For research spaces allocate 100 ft² per occupant.
3. For equipment spaces allocate x ft² per occupant.
4. For teaching spaces allocate 50 ft² per occupant
5. Locations of chemically intensive spaces are to be determined with discussion between Facilities EH&S, Planning, Facilities Maintenance, Facilities PM, and Science department requesting the space. Locations shall be designed to comply with Chapter 27 storage requirements.
6. Fire sprinkler piping:
   a. To be included at all times. If not installed at time of construction, plan for dry pipe and heads for future connections.
   b. No sprinkler heads in hoods or ducts.
7. Fire rated separations shall be provided to allow for chemical control areas.
8. Structural module of 20ft to 22ft.
9. Planning module of 10ft to 11ft.
10. Double faced aisles: 4ft-6in minimum width, 5ft desirable.
11. Single-faced aisles: 3ft-6in minimum width, 4ft desirable.
12. Counter depth: 30in, flat across entire depth.
13. Peninsula depth: 4ft-6in minimum, 5ft desirable.
14. Gas cylinders:
    a. Provide at least one wall-mounted restraint system for cylinder placement and/or storage.
    b. Placement is to be near or at fume hoods.
    c. Provide space for future gas cylinder(s).
    d. Cylinder racks shall have chain restraints at the top and bottom of cylinders.
15. Lab entrance:
    a. Door width shall be 36in to 42in to accommodate large equipment.
    b. Special cases may require door pairs. If leaves of various sizes are needed with 1 active and 1 inactive, the inactive leaf must be painted wall color in order for flush bolts to be used / allowed.
    c. Relight to corridor is desirable when possible.

Space planning & General Items continued

d. Corridor doors to have automatic closure hardware and adjusted to a slow close for safety in chemical transportation.
e. Freestanding furniture and equipment near lab entrances should be evaluated for height and weight to determine if they should be secured to the wall using common earthquake restraint practices.

16. Student desks within chemical-intensive labs, such as high chemical volume or high toxic, are to be avoided in order to discourage eating and drinking within the lab space.
17. When student desks are permitted within lab spaces, exit routes from the desks shall not pass through hazardous areas such as in front of fume hoods. The exit path shall be from greater hazard to lesser hazard.
18. Preferably student offices / desks shall be located in separate adjacent spaces.
19. Kitchenettes, human food storage, etc. should be designed / located in separate adjacent spaces, and such that path of travel from kitchenette to the office does not move through lab space.
20. Under-counter refrigerator units are not ideal and are not preferred by maintenance staff. Front vented units are required if this type of application is pursued.
21. Provide storage space for miscellaneous equipment such as carts, and other mobile equipment.
22. Areas requiring building services / utilities shall be concentrated and located near a corridor wall, not over lab bench spaces.
23. No operable windows.
24. Labs must be designed to provide environments and work areas accessible or adaptable for use by the disabled on short notice and at low cost.
25. Agreed Standard & standard process/policy for Oxygen sensors and alarming needed; not via the fire alarm.
26. Agreed Standard & standard process/policy for adding fire alarm horn or horn/strobe devices in remodels.

Chemical Evaluation and Storage

1. Evaluation of chemical types, usage, and storage must occur with UO EH&S and at the various design stages as follows:
   a. Schematic Design: Scope of users' hazardous materials use and scope of life/safety issues.
   b. Design Development: Detailed inventory of planned hazardous materials; EHS review, and consultant code path analysis & determination. Review of operational requirements specified by chosen code path.
   c. Construction Documents: Details of operational components required by code path & life/safety requirements.
2. Appropriate and allowed storage shall be provided in each lab building and lab for acids, solvents, and hazardous waste volumes as determined by Environmental Health and Safety working with lab users and the applicable Codes.
3. As much as possible, chemical intensive and other high hazard spaces are to be located on ground floors.
4. No custom fabricated chemical or acid storage units; manufactured units only. Consideration must be given to chemical storage size and weight of containers.
5. Chemical Storage should be evaluated for the inclusion of lip or other restraint systems to prevent toppling during an earthquake.
6. Flammable & Acid Cabinets:
   a. Flammable cabinets may be ventilated with exhaust if consult with UO EHS indicates there is a health/safety benefit. NO supply or make-up air to cabinets.

Chemical Storage continued

b. Must be built to flammable cabinet standards. No custom fabricated cabinets; purchased only.
c. Corrosives & Toxics storage cabinets in casework under hoods shall be vented.
d. When provided, exhaust shall be 1 cfm per square foot of cabinet footprint, piped in stainless ductwork to fume hood exhaust from the lower bung.
e. Upon consult with EH&S, ventilated cabinets may not be required in remodels or where existing infrastructures will not support adequate exhaust.

Oxygen Deficiency Monitoring & Notification

1. Evaluation of spay types, usage, and necessity of oxygen deficiency monitoring and notification must occur with UO EH&S no later than Design Development.
2. Low oxygen alarms to be provided when potential exists for hazardous materials release causing an oxygen deficiency hazard.
3. Alarm sensors shall be placed low, or high, according to the vapor density of the material displacing breathable air. Low sensors shall be 18 inches above lowest grade; high sensors, 60 inches above grade.
4. A visual and audible alarm shall be provided within affected space, and at its entry.
5. Local entry warning alarms shall be set for oxygen concentrations <19.5%; consultation with EH&S is necessary to determine if additional alarm stages are required.
6. Local notification shall incorporate an audible alert, and visual notification of a blue strobe.
7. Standard signage as follows shall be placed below strobe and where readily visible.

5"x7" 40 MIL ALUMINUM SIGN. WHITE TEXT AND BORDER ON BLUE BACKGROUND AS MANUFACTURED BY LAB SAFETY SUPPL www.labsafety.com. TEXT AS SHOWN.

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Casework & Furniture

1. Purchased and engineered furniture systems are allowed with UO (various groups listed above) review and approval and will not incorporate all components listed here.
2. All furniture and/or casework must meet expected load requirements.

Casework & Furniture continued

3. Shelf standards and brackets:
    a. Heavy duty double slotted steel.
    b. 440 pound load rating for 16 inch deep shelf.
    c. 520 pound load rating for 12 inch deep shelf.
4. Drawer and door pulls:
    a. Steel wire, 1-3/8 x 4 inch pull.
    b. US10D finish.
5. Drawer slides: Full extension type, 100 pound capacity.
6. Pull-out shelf slides; 'bread boards':
    a. Shall be considered for inclusion in each work bench.
    b. Full extension type, 100 pound capacity.
7. Hinges: Interleaf casework hinge, 5-knuckle.
8. Door Catches: Adjustable magnet type.
9. Door and drawer bumpers: Rubber, brown color.
10. Grommets:
    a. Plastic, 2in to 3in diameter opening, matching caps with slot for wire passage.
    b. Black in color.
11. Wire shelf guards:
    a. Stainless steel, brushed finish.
    b. 1/4 inch diameter.
    c. Bend to profile indicated.
    d. Lengths not to exceed 24in.
12. Typical 24in deep casework depth.
13. Utility Access:
    a. Building services / utilities shall be concentrated together and located in a corridor wall or at a lab entry.
    b. Valves, controls, and shut-offs may NOT be buried within casework without easy access.
    c. No junction boxes in or under casework.
    d. Utility service shut-off at entry into the lab space and at each lab bench / peninsula.
    e. Access must be by quarter-turn hardware per Section 08 30 00; access is NOT to include removal of screws.
14. Counter tops:
    a. High chemical exposure: cast epoxy, stone, or stainless steel. No phenolic-resin.
    b. Moderate or low chemical exposure: Acid-resistant plastic laminate.
    c. No chemical exposure: plastic laminate.
15. Reagent shelves:
    a. Peninsula supports: welded tube steel; 4in x 4in; welded top cap of the steel support required.
    b. Adjustable shelves.
    c. Wire shelf guards or seismic rods required, see above.

Finishes

1. Floors:
    a. Corrosive labs: continuous epoxy with coved corners.
    b. All other labs MUST be a seamless and continuous sheet rubber with welded seams. Continuous flooring must continue under casework, fume hoods, etc. as much as practical within project scope.
    c. Coved flooring as wall-base with silicone sealant at the top of the cove shall be considered for all project scopes. Especially those projects with existing casework and fume hoods that will not allow continuous flooring under such items.
    d. All manufacturer recommendations and directions must be followed and performed for the initial cleaning of all flooring systems.
    e. Manufacturer known to be acceptable: noraplan.
2. Ceilings:
    a. NO ceilings in lab spaces.
    b. Ceiling required in chemical storage rooms.
    c. Paint overhead elements such as structure, ducts, pipe, etc.
    d. Do NOT paint dampers, pumps, motors, belts, or labels.
3. Walls:
    a. Gypsum board or veneer plaster.
    b. FRP to be used in wet and/or animal spaces.
    c. Paint color: Benjamin Moore; 'China White'; 1412-0110 White Tint; 1402 Dolux or 1412 Ultra-Hide; 4 3YY 81/051.

Lab Equipment

1. Safety showers:
    a. Combination shower/eyewash stations known to be acceptable: WaterSaver unit EW102BP and SSBF2150.
    b. Shower only stations known to be acceptable: Haws 8122HWC.
    c. Every lab suite must have a safety shower, located as close as possible to an exit, within an exit route, and over a floor drain. Should not be located near electrical panels.
    d. Drench shower can be supported from either the wall or ceiling.
    e. Showers do not require tempered water in remodels. For new construction flushing tempered water is desired per NCZ358.1-2004.
    f. Isolation or shut-off valve for each emergency shower is required.
2. Eyewash:
    a. Eyewash units known to be acceptable: WaterSaver unit EW1022BP with ASSE 1024 dual check; WaterSaver unit EW1028VB.
    b. Sink mounted eyewashes should not be located under drying racks and/or storage.
    c. Eyewash waste to be hard-piped or a directional pipe leading to floor drain.
    d. Eyewashes do not require tempered water in remodels. For new construction flushing tempered water is desired per NCZ358.1-2004.
3. Vacuum pumps:
    a. Require spot exhaust and damper. If exhaust is routed to a fume hood then the design must not compromise fume hood containment.
    b. Acoustical enclosures are to be considered.

HVAC

1. General room ventilation shall be provided to prevent the buildup of laboratory emissions. A general room ventilation system shall maximize the clearance of contaminants from the room while minimizing overall energy use. In labs where heat load exceeds required ventilation rates stand alone cooling systems shall be considered.
2. No heating and cooling simultaneously.
3. Constant volume, VAV, and heat recovery systems are acceptable. However, the system selection shall be supported by a life cycle cost analysis and the designer shall submit an economic analysis during schematic design. Consultation with EH&S and Facilities Maintenance is also required to determine appropriate design parameters.
4. The lab designer shall provide a 'basis of design' statement for all labs that clearly defines all systems, systems criteria, and assumptions made. Documentation shall include items such as lab air change rates, description of air flow control system, equipment loading, assumed occupancy, etc.
5. Localized cooling via fan coils. Multiple or many local cooling areas shall utilize a system such as a 'chilled beam' (example only) vs. many fan coil units at each location.
6. Lab ventilation rates:
    a. 100% outside air with ventilating at a minimum of 1 cfm/ft² of floor area (6 air changes per hour) minimum in occupied lab spaces. (2007 Oregon Fire Code, 2704.3.1(2))
    b. Set-backs and/or less air changes per hour in unoccupied lab spaces may be considered in consultation with Facilities EH&S and Maintenance. Purge modes shall return the room occupancy.
    c. Higher and/or lower ventilation rates may be required and/or acceptable when the lab process is well defined. If pursued, the proposed ventilation rate must control room air contaminant concentrations below the threshold limit value.
    d. The lab designer shall include provisions for room purge mode in rooms where the use and/or storage of high hazard chemicals are anticipated. The lab designer shall work with the Facilities EH&S to determine need of purge mode and purge flow rates.
7. Single mode infrared sensors, with a minimum of 2 sensors per lab area, shall be used to establish occupied/unoccupied intervals. Schemes that utilize time-of-day light switches and/or manual switches to establish lab occupancy shall be avoided. Purge modes shall return the room occupancy.
8. Provisions shall be made for local exhaust of instruments, gas cabinets, vented storage cabinets or special operations not requiring the use of a fume hood. Dampers and taps required for future take-offs.
9. Supply air shall be properly balanced with hood exhaust in each room and slightly less than exhaust air to allow for lab rooms to be under negative air pressure at all times to areas of lower hazard.
10. Special care shall be made during renovations to seal windows and corridor wall penetrations.
11. Lab static pressures of -0.02in to -0.05in w.g. negative relative to the corridors shall be established; unless specific requirement such as bio-optics exist. Pressurization shall be established by initial balance and maintained by linked supply and exhaust flow. Through-the-wall pressurization controllers are not allowed.
12. Ganged hood ducts with dual exhaust fans are preferred to allow redundancy and half capacity.
13. Supply air filtration of 95% is required in all new lab buildings; MERV rating of 14 – 16 or HEPA.
14. Siemens DDC control systems are to be used.

Fume Hoods

1. Fume Hood manufacturers known to be acceptable: Fisher Hamilton; Labconco; Advanced Lab Concepts.
   a. Basis-of-design fume hood manufacturer shall be Fisher Hamilton; SafeAir or Concept model.
2. Hood Sashes:
   a. Vertical sashes ONLY.
   b. Automatic Sash Positioner:
      - Automatic sash positioner systems are required for new fume purchases / installations; especially in VAV air systems.
      - Factory installation is preferred versus a 3rd party installation on site.
      - Manufacturers known to be acceptable: NewTech; Advanced Lab Concepts
3. Bulletin boards shall not be mounted at fume hood ends blocking maintenance access.
4. Ductless fume hoods require EH&S and FS Maintenance review and approval.
5. Constant volume fume hoods shall have bypass grills of adequate size to maintain an acceptable face velocity over the entire range of sash movement.
6. Auxiliary air fume hoods shall not be used.
7. No chemical fume hood installations are allowed in rooms with return air to other spaces. All chemical use rooms shall have 100% exhaust.
8. In new construction hoods which are high hazard as well as radio iodination hoods must be separately exhausted.
9. All new fume hood installations shall be designed to provide face velocity of 100 FPM at 18in sash height and full open face velocity of 60 to 80 FPM. At the normal working sash height (8in to 18 in) the face velocity shall not exceed 150 FPM.
   a. All center points of a uniform nine point grid at the full open face of a hood shall have velocity readings within +/- 20 FPM of each other; ANSI Z9.5.
10. The lab designer shall specify on the drawings both full open and operating design face velocities and areas. For each hood installed with variable flow controls minimum flows and response times shall also be specified.
11. When the lab area is in the unoccupied mode it is encouraged to provide control systems that will close sashes and reduce the fume hood face velocity within parameters of health and safety.
12. Variable Air Volume (VAV) hoods present large energy use savings, and are preferred.
    a. Drawings shall specify minimum flows, and response times. Minimum exhaust volume shall be the larger of 50 cfm/ft² of hood width, or 25 cfm/ft² of hood work surface areas; ANSI Z9.5.3.3.1.
    b. When the lab area is in the unoccupied mode, control systems should reduce the fume hood face velocity of vertical rising sash styles to 65 FPM if the sash position is a maximum of 18in open – control systems shall be tied to room occupancy sensor (not hood occupancy).
    c. VAV hoods should be provided with an emergency switch that allows the exhaust volume to go to maximum flow velocity with a closed sash or for a set time; ANSI Z9.5.5.3.2.4.
13. Hood placement:
    a. The location of fume hoods, supply air terminals, lab furniture, and pedestrian traffic shall encourage horizontal, laminar flow of supply air into the hood, perpendicular to the hood opening.
    b. Hoods shall be placed at least 10ft from any doors; except emergency doors.
    c. Hoods shall be separated from each other as far as practical.

Fume Hoods continued

d. Corner locations shall be avoided unless two paths of egress are available.
e. Hoods shall be placed to avoid pedestrian traffic immediately in front of the hood.
f. Large pieces of equipment shall not be positioned in front of a hood.
g. In new construction hoods shall not be placed where they would face each other across a narrow aisle (6ft minimum spacing) as this will cause turbulence at the face of the hood.
h. Fume hoods should be secured to the wall using common earthquake restraint practices.

14. Fume Hood Testing & Commissioning:

a. Proper operation of fume hood must be demonstrated by the contractor installing the fume hood prior to project closeout. EH&S may provide this service in a remodel.
b. All new and renovated fume hood installations shall be properly commissioned with a balance performed of the total exhaust flow using a duct traverse followed by face velocity measurements. If the hood equipped with VAV or two position controls, these shall be exercised in all modes of the intended operation.
c. Hood testing shall be in accordance with current methods outlines in ASHRAE standard 110.
d. Where possible the recommended containment performance test is ANSI / ASHRAE 110. UO Standard Operating Procedure EHS-LS-01 may be used for remodel work.
e. All center points of a uniform nine point grid at the full open face of a hood shall have velocity readings within +/- 15 FPM of each other.

15. Controls and Alarms:

a. All new hoods must be equipped with minimum and alarm points:

- Visible and audible alarms for high and low face velocity.
- Local alarm reset and calibration.
- Dry contact for alarm status.
- Low-flow alarm required.

b. VAV hoods shall be equipped with indicators of airflow (CFM) and/or energy use.
c. VAV hoods control systems shall have a minimum acceptable response time of 10 seconds.
d. Within design discussions, determination of need for optional user over-ride on VAV shall be accommodated for full exhaust with a DDC system reset to VAV after 2 hours with a digital display of remaining time until VAV reset.
e. The minimum acceptable speed of response time for VAV hood control system to maintain face velocity set-point upon repositioning the sash in 10 seconds.

16. Supply Air Criteria:

a. Supply air delivery must be designed to ensure hood performance and safety.
b. Perforated ceiling / plenum supply air or perforated duct diffusers may be used. Discharge velocities may not exceed 200 FPM at the diffuser outlets or anywhere else within the lab room.
c. Air velocity caused by supply outlets, window drafts, traffic, etc. shall not exceed 30 – 50 FPM at the hood face when the exhaust fan flow if forced off.
d. The minimum distance from a diffuser to the face of the hood shall be 4 feet.

17. Ducting Details:

a. Exhaust ducts shall be sized for 1400 – 2000 FPM velocity at full flow.
b. Duct materials shall be compatible with vapors to be exhausted. Stainless steel (type 304, 18 gauge) shall be used with most solvents and potentially flammable vapors. PVC ducting (type 1, grade 1, and schedule 10) shall be used for corrosive vapors and perchloric acid.
c. All duct seams and joints shall be sealed. Stainless steel ductwork shall be welded. Solvent welding is acceptable for PVC and FRP ductwork.

Fume Hoods continued

d. Fume hood exhaust ducts shall not contain fire dampers.
e. Effluent discharge shall be a minimum of 8ft above the roof surface with velocity of 3000 FPM at full flow.
f. Fans shall be as close to the discharge point as possible. If located in a mechanical penthouse, the penthouse shall be ventilated at a minimum rate of 1 air change per hour.
g. Duct chases shall be reasonably oversized for future additional ducts. Systems that require maintenance or inspection shall be accessible. Labs backed on utility corridors are encouraged.
h. Access for cleaning at top of fume hood is required.

18. Fume Exhaust Fans:

a. All fans used for fume exhaust shall be AMCA Type B spark-resistant construction.
b. Fans shall be Class 1 belted utility sets with a steel scroll sized to operate below 2000 RPM. All components exposed to the air stream shall be coated with primer, baked enamel and baked Heresite. In-line centrifugal fans of the same material and coatings are acceptable where space precludes the use of a utility fan. Fans constructed of PVC or FRP shall be used where high concentrations of corrosives are anticipated.
c. Design team explanation / demonstrate how HVAC will mitigate a vapor from x-amount of open containers of chemical-y (scenario to be chosen by U of O EH&S).
d. The design must carefully consider acoustics and result in a lab noise level of NC 50 or lower. Proper acoustic design shall be accomplished by providing appropriate fan size and type. Sound attenuators are acceptable, though not preferred. When used, sound attenuators must be constructed of 304 stainless steel and pack less.

19. Fume Hood Interior:

a. Work surfaces are to be cast epoxy or stainless steel
b. Radioisotope hoods are to have stainless steel or impervious work surfaces and liners.
c. Work surface is to be dished.
d. Hood liners are to be poly-resin, epoxy, or stainless steel.

20. Existing hoods that are functional may be relined with Facilities EH&S and Maintenance approval.

21. Service valves, switches, etc. are to be front-mounted for serviceability.

22. Interior light must be accessible from outside of the hood for replacement and service.

23. Duplex 120v grounded GFI outlet on both left and right face of hood.

24. At least one fume hood per lab complex is to be adaptable for ADA use.

25. NO gas allowed within bio-safety hoods.

26. Explosion-proof and any special-use hood interiors shall be reviewed and approved by Facilities EH&S and Maintenance.

Plumbing

1. Backflow prevention:

a. To be provided either building-wide, by floor, by zone, or by lab.
b. Approach to be determined by Facilities EH&S and Maintenance with each project.

2. If lab use calls for a plaster trap, ‘Gleco Trap’ is a code compliant system.

3. Piping material standards:

a. Cold water: copper type L, insulated.
b. Hot water: copper type L, insulated.

Plumbing continued

c. Compressed air: copper type L braised joint, or black iron schedule 40.
d. Natural gas: black iron. Do not use threaded connectors; couplings must be used.
e. Nitrogen: copper type L, braised joint, purge pipe per proper nitrogen installation procedure.
f. Purified water: threaded PVC schedule 80.
g. Lab pipe shall be IPEX Labline (formerly called 'Enfield') with mechanical joints.

- Fusion welded joints are not allowed. Exception may be granted for buried below-grade piping.
- Tie to main with cement solvent through lab bench or sink, threaded is preferred.

4. Sinks:

a. Epoxy resin or stainless steel.
b. Specify standard sizes only.
c. Molecular Biology, deck-mounted stainless steel only.
d. Cup sinks with non-removable strainers preferred. If removable-type strainers are specified, they must be mechanically attached and removable by UO Maintenance.

5. Valves, controls, and shut-off valves:

a. To be provided for ALL utilities and services at each lab, each peninsula, and each emergency shower.
b. May NOT be buried within casework without easy access.
c. If they are located within chases or casework, then access must be at open knee-wells or peninsula ends.
d. All valves shall be clearly labeled at appropriate intervals.

6. Service fittings:

a. To be wall mounted with exposed piping and valves.
b. At peninsulas, fittings are to be mounted to tube steel supports with exposed piping and valves.

7. Non-potable water:

a. Supply to laboratories, makeup water, equipment cooling or similar applications shall be isolated from the domestic water system by use of a reduced pressure backflow preventer.
b. All outlets served by non-potable water shall have prominently displayed signs stating 'Non-Potable Water – Do Not Drink'.
c. Purified or polished water shall be piped from centralized RO system to a location where lab user can connect a water polisher that they provide.

Electrical

1. Spare conduits and circuits with homeruns to the panel are required; minimum of two 3/4" conduit runs.

2. Lighting:

a. Occupancy sensors controlling under-counter fixtures are to be switched / controlled with overhead lighting as well vs. separate switching / occupancy.
b. Up and down light is to be provided within 1 fixture.
c. Higher lighting levels are to be achieved with task lighting.

3. Power:

a. Panel locations are to be at lab entries. Either exterior in the corridor prior to entry, or interior and immediately adjacent to entry.
b. Safety shower and egress shall not interfere with electrical.
c. Disconnect switch for each lab is required at panel / entry.

Electrical continued

4. Wiremold:
    a. Single channel equal to wiremold 3000 or 4000 series, depending on the application.
    b. Double channel required in all computer lab applications.
5. Emergency and standby power requirements and locations are to be determined by Facilities EH&S and Maintenance for each project with research requirements in mind.
6. Telecom and Data:
    a. Distribution capability to all areas is required, for current and future potential needs.
    b. Distribution from building IDF, except in high-intensity areas such as computer labs.
    c. Provide at least one phone location per lab.
    d. Minimum 18” to 24” clearance above work surface / desk areas and any upper shelves.

End of Section