



## **CONSTRUCTION ENVIRONMENTAL HEALTH & SAFETY EXHIBIT**

### **EQUIPMENT SAFETY**

#### **I. General Requirements**

- A. At a minimum, the use of equipment and tools shall comply with the recommendations and requirements for safe use, as set forth by the manufacturer, or with the requirements set forth in this Standard, whichever is more stringent.
- B. Each **Contractor** whose employees are required to use equipment or tools as part of executing their assigned task(s) is required to have an equipment safety program, specific to type of equipment or tool, which meets or exceeds the guidelines listed in this Standard. This program shall be part of the **Contractor's** HASP.
- C. The employer's **Competent Person** shall ensure that all **Employees** potentially exposed to hazards associated with the use of equipment and tools possess the knowledge and skill required to perform the duties for which they are assigned. In addition, a hazard analysis shall be completed with any equipment hazards clearly identified, and hazard controls defined. The hazard analysis shall be reviewed with the work crews prior to the start of work, and where conditions change. This hazard analysis shall include the proximity to live power lines.
- D. It is the responsibility of each **Contractor** to ensure that all types of equipment are inspected prior to use, as recommended by the manufacturer. It is the responsibility of the user of the equipment or tool to conduct an inspection of the tool prior to its use, regardless of previous inspections. Damaged equipment and tools shall be tagged out and removed from service, and shall not be used until repairs have been made.
- E. Each piece of motorized equipment shall be inspected by the owner or renter of the equipment (i.e. not only the rental company) prior to entry onto the project. An inspection sticker or report will be placed onto the equipment, in a visible location. At a minimum, the inspection shall document the presence/functionality/condition (if applicable) of the emergency brake, rollover protection, falling object protection, machine guarding, exhaust scrubber, steps to cab or engine, turn signals, lights, backup alarm, windshield/glass condition, anti-two block device, load chart, cable condition, drums/sheaves/sheave pins/pulleys, fire extinguisher, seat belts, as well as manufacturer-listed safety items. The inspection sticker/report shall show the date of inspection and the name, company, and title of the inspector.
- F. Fall protection is required for all maintenance/set-up activities where **Employees** are exposed to falls equal to or greater than six feet.
- G. **The use of University-owned or rented equipment/tools by non-University employees is strictly prohibited without prior written consent and appropriate training.**

#### **II. Aerial Lifts**

- A. The use of all types of aerial lifts shall comply with OSHA 29CFR Part 1926.453, at a minimum.
- B. Training, by a person qualified on the subject matter, shall be provided for all **Employees** required to operate or work in or from aerial lifts. Training shall include the following, at a minimum:
  - 1. The nature of hazards associated with the operation and use of the specific model being utilized;
  - 2. Pre-use inspection and maintenance requirements associated with the specific model being utilized;



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3. The proper operation and use of controls for the specific model being utilized;
  4. The nature of electrical hazards, including overhead lines, in the work area;
  5. Fall protection requirements for the equipment being utilized;
  6. The nature of falling object hazards associated with the use of aerial lifts;
  7. The nature of pinch point hazards associated with the use of aerial lifts, specifically the placement of hands and arms when the aerial lift is being operated; and
  8. The maximum allowable load rating, including personnel and materials for the specific model being utilized.
- C. Operators and occupants of aerial lifts shall carry verification of the aforementioned training while utilizing aerial lifts. This verification shall be produced upon request.
- D. The hazards and hazard controls associated with the use of aerial lifts, specific to the operation at hand, shall be documented as part of the hazard analysis, and shall be reviewed with the workforce prior to commencement of activities.
- E. Aerial lifts shall be inspected by the operator each shift prior to use, in accordance with the manufacturer's requirements. This inspection will be posted on the aerial lifts (see Section I – Steps D. and E.). Aerial lifts not meeting inspection criteria shall be immediately taken out of service, locked, and tagged out, until appropriate repairs have been made.
- F. Any person observed utilizing an aerial lift in an unsafe manner shall be cause for the **Foreman** or supervisor to immediately halt the operation of the aerial lift, and conduct re-training, at a minimum. Training or re-training is the responsibility of the employer.
- G. Where falling object protection cannot be assured the area(s) below the basket or platform of aerial lifts shall be cordoned off using DANGER tape. Danger signs informing project personnel of the overhead hazard shall be posted at the area perimeter.
- H. Any aerial lift operating on inclined/declined surfaces (within the manufacturer's allowable conditions) shall have its wheels chocked to prevent movement.
- I. Aerial lifts shall not be used to hoist/raise/position materials outside of the basket or platform. The sum weight of all tools/materials/personnel shall not exceed the maximum load rating for the equipment.
- J. Operators or occupants shall not exit the basket or platform of an aerial lift when in the raised position, unless ALL of the following criteria are met:
1. The platform must rest on a stable surface;
  2. 100% fall protection, independent of the platform, must be immediately available and utilized;
  3. The manufacturer does not disallow use of the equipment for this purpose.
- K. Modifications to aerial lifts are allowed only with the written, explicit approval of the manufacturer or manufacturer's authorized representative.

### **III. Elevators and Personnel Hoists**

- A. At a minimum, the use, inspection, set-up, and maintenance of personnel hoists shall comply with 29CFR Part 1926.552, ANSI A10.4-2016, and the manufacturer's recommendations and requirements.
- B. Prior to installation of a personnel hoist, a review shall be conducted by a Commonwealth of Massachusetts-Registered Professional Engineer. The review shall specifically include the foundation requirements and structural connection details. The Engineer's report shall be submitted to the **General Contractor**, hoist erector, and project structural engineer for review.



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- C. An erection, dismantling, and inspection plan shall be submitted to the **General Contractor** prior to commencement of these activities. The plan shall include, at a minimum, the procedures required to erect/dismantle/inspect the hoist, a list of the qualified individuals who will perform the work, a hoisting plan, and fall protection procedures to be employed.
- D. Riding on top of the car is not permitted except during the erection, dismantling, and inspection operations. During these periods, the car may only be operated by the person(s) on the top of the car. Operation of the car from inside the cab is not allowed.
- E. The designated operator(s) shall be trained in the use, daily inspection and maintenance, and emergency procedures associated with the operation of the personnel hoist. This training shall be conducted by the manufacturer or his designee, documented, and a copy shall be provided to the **General Contractor** upon completion. Untrained operators shall not operate the hoist.
- F. For permanent elevator construction, the false car or temporary platform will be enclosed on all sides by guardrails and toeboards, in compliance with 29CFR Part 1926.502. A removable front rail shall be provided on the car to provide access onto and off of the car.
- G. For permanent elevator construction, any side or sides of the false car/temporary platform where potential pinch points or struck by hazards, including counterweight rails and car rails (at rollers) shall be enclosed and protected. Where these protective devices must be removed to perform work, the car shall be locked and tagged out prior to removal, in accordance with the Harvard Construction HUEHS Control of Hazardous Energy Exhibit.
- H. For permanent elevator construction, a falling object protection system, consisting of a minimum of 3/4" plywood and 2" framing, shall be installed above the car, and shall extend at least to the perimeter of the car floor.
- I. Following erection or installation, the hoist or elevator shall be inspected by the manufacturer or his designee, and shall be documented. This inspection report shall be submitted to the **General Contractor** upon completion.

#### **IV. Hand and Power Tools**

- A. At a minimum, the use, inspection, set-up, and maintenance of hand and power tools shall comply with 29CFR Part 1926.300 through 1926.307 (or other applicable standard), and the manufacturer's recommendations and requirements.
- B. The hazards and hazard controls associated with the use of hand and power tools, specific to the operation at hand, shall be documented as part of the hazard analysis, and shall be reviewed with the workforce prior to commencement of activities.
- C. Operators of tools and equipment must be thoroughly knowledgeable and fully understand the proper use, inspection, maintenance requirements, and hazards associated with that tool/piece of equipment. It is the responsibility of the **Foreman** or supervisor to ensure that the operator is competent prior to use. Where the operator does not demonstrate a thorough knowledge and understanding of the tool/equipment, a formal training session shall be conducted by the employer. This training shall be documented.
- D. At a minimum, all tools and equipment shall be inspected prior to use by the operator. Any tool or piece of equipment found to be defective or damaged shall be removed from service.
- E. All stationary power tools and equipment that use a toggle switch to power on and off shall be equipped with an emergency shut-off switch (push-stop or equivalent) and a magnetic



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drop-out switch to prevent automatic re-start in the event of a power loss, whether standard or manufacturer-approved retro-fit. This includes but is not limited to table saws, masonry saws, and portable cement mixers.

- F. Where the manufacturer requires or recommends the use of guarding (e.g. hand-held grinders, table saws, etc.) for employee protection, the equipment/tool shall not be used without the guard. Where it is necessary to remove a guard on a table saw, the hazard analysis shall specifically address the requirements for employee protection (e.g. use of a 'push-stick').
- G. Where the manufacturer requires or recommends the use of an auxiliary handle (e.g. hand-held grinders, band saws, demo saws, etc.) to provide for two-hand use, the equipment/tool shall not be used without the proper handle. In those circumstances where the handle on a hand-held grinder cannot be used due to limiting conditions, the hazard analysis shall specifically address the requirements for employee protection.
- H. Hand-held grinders shall be equipped with on-demand/constant pressure power switches. Hand-held grinders with toggle type on/off switches shall not be used.

#### **V. Heavy Equipment**

- A. At a minimum, the operation, inspection, set-up, and maintenance of heavy equipment shall comply with 29CFR Part 1926.600 through 1926.606, 520CMR6.00 through 6.11, and the manufacturer's recommendations and requirements.
- B. Operators of heavy equipment shall possess a Commonwealth of Massachusetts – Department of Public Safety Hoisting License, for the type of equipment that he/she operates. Operators of equipment to which these licensing requirements do not apply, including motorized buggies, aerial lifts, etc., shall be trained in accordance with the manufacturer's requirements. This training shall be documented and produced upon request.
- C. The hazards and hazard controls associated with the use of heavy equipment, specific to the operation at hand, shall be documented as part of the hazard analysis, and shall be reviewed with the workforce prior to commencement of activities.
- D. Any person observed utilizing a piece of equipment in an unsafe manner shall be cause for the **Foreman** or supervisor to immediately halt the operation of the equipment, and conduct re-training, at a minimum. Training or re-training is the responsibility of the employer.
- E. Operators are required to wear seat belts at all times on equipment provided with such.
- F. The operator is responsible for proper equipment mobilization, set-up, inspection, and use.
- G. The operator must not engage in any activity that may divert his/her attention from the operation of the equipment (e.g. talking on a cellular phone, etc.).
- H. The operator is responsible for immediately halting the operation of the equipment if any condition or circumstance presents itself that may jeopardize the safety of personnel or property, or the integrity of the equipment.
- I. Ground personnel working around heavy equipment shall wear a high-visibility, reflective vest at all times.
- J. Where heavy equipment moves forward and backward frequently, or where equipment enters and exits an area frequently, a designated walkway or path around this area shall be provided for site personnel not directly involved with the operation. Where this is not feasible, a full time spotter shall be used to direct the equipment and personnel.



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- K. Passengers or riders are not allowed on heavy equipment, unless specifically designed to do so.

#### **VI. Ladder Safety**

- A. At a minimum, the use, inspection, and set-up of ladders shall comply with 29CFR Part 1926.1053, and the manufacturer's recommendations and requirements.
- B. The employer's **Competent Person** shall ensure that all **Employees** potentially exposed to hazards associated with ladders possess the knowledge and skill required to perform the duties for which they are assigned. In addition, the hazards and hazard controls associated with the use of ladders, specific to the operation at hand, shall be documented as part of the hazard analysis, and shall be reviewed with the workforce prior to the commencement of activities. Portable ladders shall be Type IA (300 pound), minimum. Job-made ladders shall be constructed in accordance with ANSI A14.4-2009. Aluminum or metal ladders are not allowed on construction sites, except where the ladder is a fixed ladder, or part of a scaffold system. Use of aluminum extension ladders is allowed only for exterior work (e.g. painting or other similar short-term activity) on existing structures where the **Contractor** can demonstrate that no potential electrical hazards exist, and the use of scaffolding or aerial lifts is not feasible as an alternative.
- C. Ladders shall be inspected each shift prior to use by the employee using the ladder. Ladders used by the general workforce (i.e. access ladders and job-made ladders) shall be inspected by the **General Contractor** or owner of the ladder. Ladders shall be inspected for damage, defects, wear, and cracks at least weekly. Damaged or defective ladders shall be tagged or marked as such, and shall be removed from service by the inspector.
- D. Work Practices (NOTE: Work practices and ladder use/set-up shall also comply with the HUEHS Fall Prevention and Protection Exhibit as applicable)
1. When ascending or descending, the employee shall face the ladder, and shall maintain three points of contact. Where tools or materials must be carried, they shall be carried in a tool belt/pouch, or shall be hoisted using a rope or handline.
  2. Employees must always work facing the ladders, and shall not straddle the ladder.
  3. Employees working from ladders must maintain their center of gravity (mid-section) between the vertical rails of the ladder.
  4. Stepladders shall be used in the fully open position, and placed on a firm, stable level.
  5. Stepladders shall not be used to access higher or lower levels, whether the ladder is fully open or not. Job-made, fixed, or straight/extension ladders shall be used to access higher or lower levels.
  6. Straight/Extension and job-made ladders shall be secured at top and base when used to access higher or lower levels.
  7. Straight/Extension ladders shall be set at an angle of approximately seventy-five (75) degrees off horizontal and must reach at least 3 feet above the upper landing.
  8. Extension ladders sections shall not be separated and used independently.
  9. Ladders shall not be placed in front of doors or gates unless the door/gate is blocked open, locked (with signs placed), or guarded. Means of egress and travel ways shall not be blocked without the consent and coordination of the **General Contractor**, or in the case of existing buildings, the consent of the **General Contractor** in consultation with the HUPM.
  10. Stepladders shall not be 'walked' or moved while employees are on the ladder.



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#### **VII. Motor Vehicles and Jobsite Transportation Rules**

- A. At a minimum, the use, inspection, and operation of all motor vehicles shall comply with 29CFR Part 1926.601(b), and the manufacturer's recommendations and requirements.
- B. The operator must not engage in any activity that may divert his/her attention from the operation of the vehicle (e.g. talking on a cellular phone, etc.).
- C. All operators and passengers of motor vehicles are required to wear seat belts at all times while the vehicle is being operated.
- D. Transportation of persons in the back of pick-up trucks is prohibited.
- E. Motor vehicles shall not be used to transport compressed gas bottles on the project site, unless the bottles can be positively secured in the upright position and the valve protection caps in place and secured.
- F. Motor vehicles shall not be used to pull or tow unless the vehicle and attachments are specifically designed to do so.

#### **VIII. Powder-Actuated Tools**

- A. At a minimum, the use, inspection, and operation of powder-actuated tools shall comply with 29CFR Part 1926.302(e), ANSI A10.3-1970, and the manufacturer's recommendations.
- B. The hazards and hazard controls associated with the use of powder-actuated tools, specific to the operation at hand, shall be documented as part of the hazard analysis, and shall be reviewed with the workforce prior to commencement of activities.
- C. The substrate (e.g. concrete slab, steel, etc.) where powder-actuated fasteners are to be set shall be assessed against the type of fastener and the rating of the charge to ensure that it is appropriate for the application. This is the responsibility of the employer's **Competent Person**. Documentation of this assessment shall be produced upon request.
- D. The area(s) on the side opposite of the substrate to be fastened to shall be inspected by the operator to ensure that no personnel are present. Where the substrate to be fastened to is any material other than concrete or steel, the area(s) on the side opposite the substrate shall be cordoned off to prevent entry. Danger signs warning personnel of the hazard shall be posted.
- E. Operators of powder-actuated tools shall be trained in accordance with the manufacturer's requirements, and shall possess a valid training card for the particular make/model being used. Documentation of training shall be carried by the operator, and shall be produced upon request.
- F. The tool and all associated safety devices shall be inspected and tested each day prior to loading in accordance with the manufacturer's equipment inspection and testing guidelines.
- G. Operators of powder-actuated tools shall don, at a minimum, **safety glasses and a face shield or tight-fitting protective goggles**, and hearing protection, in addition to other project-required protective equipment.
- H. The operator of the tool shall ensure that no other unprotected **Employees** are present in the immediate vicinity prior to firing.
- I. Immediately prior to firing the tool, the operator shall, in a loud voice, say 'FIRE' or 'FIRING'. This will be repeated prior to each time the tool is fired.
- J. Where a powder-actuated tool misfires, the operator shall not attempt to reuse the same firing shot or cap. The shot/cap shall be replaced, or the strip shall be forwarded.



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- K. Spent or misfired shots/caps shall be placed into a container of water as they are generated, and disposed of properly at the end of the shift. Spent or misfired shots/caps shall not be thrown or placed on the floor.

#### **IX. Rotating and Non-Rotating Laser Use**

- A. At a minimum, the use and inspection of lasers, both rotating and stationary, shall comply with 29CFR Part 1926.54, ANSI Z136.1-2014, and the manufacturer's recommendations. The owner's manual shall be kept with the equipment, and shall be produced upon request.
- B. Laser users shall be trained and certified for the class of laser he or she is using. Proof of qualification shall be maintained on the user, and shall be produced upon request.
- C. Where Class II or more powerful lasers are used, appropriate laser warning placards shall be conspicuously posted on the equipment, and laser warning signs shall be posted in the area where the beam reaches/affects.
- D. Where a certain model or class laser requires the use of a specific eye protection for protection against direct or reflected laser light, this operation shall be conducted only in an area where access is restricted to only the user(s) or shall be done off-hours.

#### **X. References**

1926 Subpart I, Tools Hand and Power