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Standard Operating Procedure
for
The Use of Powered Industrial Vehicles

REVISION

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1. PURPOSE

- 1.1 To provide written procedures and guidelines governing the requirements for the use of powered industrial vehicles at the College of NanoScale Science and Engineering (CNSE).
- 1.2 To prevent accidents involving powered industrial vehicles.
- 1.3 To comply with the requirements of Occupational Safety and Health Administration (OSHA) 29 CFR 1910.178 (Powered Industrial Trucks) and ANSI/NFPA 505-2006, (Fire Safety Standard for Powered Industrial Trucks- Type Designations, Areas of Use, Maintenance and Operation).

2. SCOPE

- 2.1 This specification applies to the use of powered industrial vehicles at CNSE. Industrial power vehicles present a serious possibility of bodily injury and property damage, if not operated correctly.
- 2.2 The responsibility for preventing power vehicles accidents rests solely with the operator. Pedestrians always have the right of way and powered vehicles must yield to them. Pedestrians often perform careless acts, but the powered vehicle operator must be aware of these acts, as well as any problem areas in the facility and take whatever steps are necessary to avoid accidents.
- 2.3 This program applies to CNSE employees/students, tenant employees, contractors and sub-contractor who may be performing an activity or operation within the facility that involves the use of a powered industrial vehicle. Tenant employees, contractors and sub-contractors may comply with their own organization's program provided that it meets and/or exceeds the minimum requirements set forth in this procedure.
- 2.4 CNSE employees/students, tenant employees, contractors and sub-contractors will be notified of the requirement to follow this program and are required to comply with the restrictions and limitations imposed upon them by CNSE during site activities.
- 2.5 This procedure contains safety requirements relating to fire protection, design, maintenance, and use of fork trucks, tractors, platform lift trucks, motorized hand trucks, motorized FOUN/FOSB carts and other specialized industrial vehicles powered by electric motors or internal combustion engines (gasoline, propane, etc.). This procedure also includes use and operation of pallet jacks and hand trucks that are non-motorized. This section does not apply to compressed air or nonflammable compressed gas-operated industrial trucks or to vehicles intended primarily for earth moving or over-the-road hauling.

3. DEFINITIONS

The following definitions apply to the various powered industrial vehicles used at the CNSE facility.

- 3.1 **Approved industrial vehicle-** equipment that must be listed or approved for fire safety purposes by a nationally recognized testing laboratory, using the standards for nationally recognized testing labs.
- 3.2 **Powered Industrial vehicle-** Any fork truck, platform lift truck, motorized hand truck and other specialized industrial trucks powered by electric or internal combustion engines and used to carry, push, pull, lift, stack or tier material.
- 3.3 **Designations-** Refers to the truck's power source (diesel, gas, electric or liquefied propane gas) and if the truck is equipped with any additional safeguards to the exhaust, fuel and/or electrical systems. The designation will also indicate any locations where the truck may not be used such as in atmospheres containing flammable vapors or dusts.

For the purpose of this standard there are eleven different designations of industrial vehicles as follows:

- 3.3.1 **D** - Diesel.
- 3.3.2 **DS** - diesel with additional safeguards.
- 3.3.3 **DY** - DS with no electrical equipment and equipment with temperature limitation features.
- 3.3.4 **E** - electric.
- 3.3.5 **ES** - electric with additional safeguards to prevent sparks and limit surface temperatures.
- 3.3.6 **EE** - completely enclosed electric motor.
- 3.3.7 **EX** - electric units acceptable in areas containing flammable vapors or dusts.
- 3.3.8 **G** - gasoline.
- 3.3.9 **GS** - gasoline with additional safeguards.
- 3.3.10 **LP** - liquefied petroleum.
- 3.3.11 **LPS** - liquefied petroleum with additional safeguards.

- 3.4 **FOUP/FOSB carts** – manual or powered cart used for the transportation of wafers and their containers.
- 3.5 **Hand Truck** - A two-wheeled cart for moving heavy objects by hand, consisting of a vertical framework with handles at the top and a metal blade at the bottom that is inserted beneath a load, the entire assembly being tilted backward until balanced for easy pushing or pulling.
- 3.6 **Pallet Jack**- A type of powered industrial truck designed to move palletized materials. These trucks may be called *walkies*, or *walkie riders*.
- 3.7 **Vehicle** – a carrier, a means of carrying or transporting something.

4. ASSOCIATED DOCUMENTS

- 4.1 **EHS-00035-F1** - Powered Industrial Truck Test
- 4.2 **EHS-00035-F2**- Performance Test for Forklift Operators
- 4.3 **EHS-00035-F3**- Forklift Inspection Checklist

5. RESPONSIBILITIES

It is the responsibility of all CNSE supervisors, managers, tenants or individuals who operate powered industrial vehicles at the CNSE facilities to ensure that the proper procedures, as detailed below, are followed.

- 5.1 **Supervisors and Managers**
 - 5.1.1 It is the responsibility of each CNSE Manager (host), who contracts the services of contractor/ vendor personnel (contractor) to perform work on CNSE property, to ensure that the contractor: is trained on the use of powered industrial vehicles; and is aware of the potential hazards associated with the required work and the proper procedures (detailed below) for the operation of the equipment.
 - 5.1.2 All new powered industrial vehicles, acquired and used at CNSE, shall meet the design and construction requirements for powered industrial vehicles established in the "American National Standard for Powered Industrial Trucks, Part II, ANSI B56.1-1969", and must be marked appropriately, except for vehicles intended primarily for earth moving or over-the-road hauling or other applicable vehicle standards.
 - 5.1.3 Regular disciplinary procedures will be followed by the supervisor, in the case of an employee who is not cooperative towards adherence of powered vehicle safety regulations.

- 5.1.4 Supervisors are responsible for the safe operation of the vehicles by their employees.
- 5.1.5 When a discipline problem arises with an employee, the supervisor will be advised and a consultation arranged to discuss the problem.
- 5.1.6 If after the consultation session with the employee, the safety matter is not corrected the individual's license may be revoked by the EHS Manager.

5.2 **Employee/Operators**

- 5.2.1 No power vehicle may be operated at CNSE unless the operator has completed a classroom program, and an operator skills competency test. Only employees who will regularly use power vehicles will be allowed to take the course as outlined below:
- Complete an operator classroom session which will include presentation of safe operation movies, general discussion, and a written quiz (See EHS-00035-F1, Powered Industrial Truck Test).
 - Complete a skills demonstration session to prove the ability to properly handle the vehicles (See EHS-00035-F2, Performance Test for Forklift Operators).
- 5.2.2 Powered vehicle operators are responsible for the action of both their vehicle and themselves. Operators' licenses will be revoked for those employees who operate in a reckless or unsafe manner.

5.3 **EHS Department or Designated Trainers**

The EHS Department shall be responsible for:

- 5.3.1 The type and layout of the skills test.
- 5.3.2 Licenses will be permanent, but employees should attend a refresher course every 3 years. EHS Department will maintain all records.
- 5.3.3 [Issuance of the 'Operator Certification Card' to be carried by drivers while operating vehicles.](#)
- 5.3.4 Forklift driver trainers will be designated by the EHS Manager at CNSE.
- 5.3.5 The driver trainers will be responsible for:
- Conducting skills demonstration classes and skills tests for the training and evaluation of drivers.

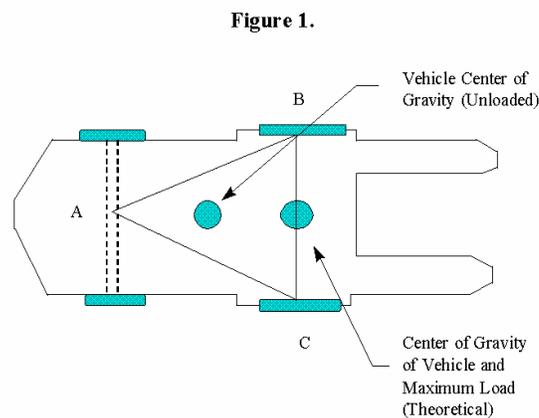
- Acting as a liaison between the sites powered vehicle operations and the EHS Department, or authorized representative.
- Handling minor discipline and enforcement problems as they arise and reporting these to the appropriate supervisor and EHS Department.

6. EQUIPMENT REQUIREMENTS

- 6.1 These safety requirements cover the design, use, maintenance and fire protection of fork trucks, platform lift trucks, motorized hand trucks and other specialized industrial vehicles powered by electric or internal combustion engines.
- 6.2 All powered industrial vehicles used must meet the design and construction requirements of ANSI B56.1.
- 6.3 Powered industrial vehicles approved for use in hazardous locations must have a label or identifying mark indicating the approval of the testing laboratory.
- 6.4 No modifications or additions that affect capacity and safe operation may be made without prior written approval from the EHS Manager. Capacity, operation and maintenance instruction plates, tags or decals must be changed accordingly.
- 6.5 If the vehicle is equipped with extra front-end attachments, you must have the vehicle marked to identify them. These markings must show the approximate weight of the truck, and attachment combination at maximum elevation with load laterally centered.
- 6.6 The vehicle owning department is responsible for maintaining all nameplates and markings.
- 6.7 Internal-combustion engine powered industrial vehicles are not permitted for use inside any of the CNSE buildings.
- 6.8 Operators are required to wear seat belts on trucks equipped with them.
- 6.9 Owner must use seatbelt retrofit kits if the truck manufacturer provides them.

7. GENERAL OPERATOR PROCEDURES

- 7.1 Operators must be trained and authorized before being permitted to operate a powered industrial vehicle.
- 7.2 The weight of the load being lifted or carried shall not exceed the stated load capacity of the mechanical device being used.
- 7.3 A load, or separate items of a load (e.g. boxes, bags, etc.) shall be prevented from moving during handling, if necessary. Methods to prevent movement include, but are not limited to, the use of plastic wrap or straps.



NOTE: When the vehicle's line of action, or load center, falls within the stability triangle, the vehicle is stable and will not tip over. However, when the vehicle's line of action or the vehicle/load combination falls outside the stability triangle, the vehicle is unstable and may tip over.

- 7.4 Hand-trucks and carts shall be pushed rather than pulled.
- 7.5 The height of a load shall not obstruct the handler's direction-of-travel view.
- 7.6 If the handler is using a hand-truck or hand-cart, and their direction-of-travel view is obstructed, they shall do either of the following:
1. Divide the load into two or more smaller loads, if possible, such that the height of each load does not obstruct the handler's direction-of-travel view, or

2. Obtain assistance from another individual for purposes of guiding them, and to ensure that the path of travel is clear.
- 7.7 A handler using a powered industrial vehicle may drive in whichever direction (forward or reverse) that provides the best visibility of the direction of travel, or they may use either of the procedures described in Paragraph 7.6.
 - 7.8 In areas where mechanical methods are used to handle material, sufficiently safe clearance shall be provided in aisles, at loading docks, through doorways or wherever passage with mechanical equipment must be made.
 - 7.9 In areas where mechanical methods are used to handle material, such as loading docks and designated material handling routes, clearance signs shall be provided to warn of vertical clearance limits.
 - 7.10 Aisles and passageways shall be kept free from obstructions, and floor surfaces of aisles and passageways shall be kept in good repair.
 - 7.11 Permanent aisles and passageways shall be appropriately marked.
 - 7.12 Dock boards and bridge plates shall be properly secured to prevent their movement while being utilized.

8. TRUCK AND FORKLIFT OPERATION

- 8.1 Only knowledgeable employees who understand the equipment and its operation will be permitted to operate a forklift. All other employees must understand the risks associated with forklift truck operation.
- 8.2 Never try to get a forklift driver to ignore proper procedures.
- 8.3 Never distract an operator or create obstructions or risks.
- 8.4 If you are a driver, never cut corners or take chances as this increases the chance of an accident.
- 8.5 By regarding the operation of a forklift as serious business, following the detailed list of safety requirements, exercising caution and common sense, forklifts can be used without risk to safety of the operator or those around them.
- 8.6 Trucks must not be driven up to anyone standing in front of a fixed object.

- 8.7 No one may stand or pass under the elevated portion of a truck whether it is loaded or empty.
- 8.8 Riders are permitted on vehicles only where a safe, manufacturer-approved seat has been provided with the appropriate seat belt restraints.
- 8.9 Arms or legs must not be placed between the uprights of the mast or outside the running lines of the truck.
- 8.10 When a powered industrial vehicle is left unattended (9.10.1), lower the load-engaging means, neutralize controls, shut off power, **remove the** key and set brakes. Block the wheels, if the truck is parked on an incline.
- 8.10.1 Unattended means the operator is 25 feet or more away, or out of view of the truck.
- 8.11 If the operator has dismounted, but is within 25 feet and the vehicle is still in view, the load engaging means must be lowered, the controls neutralized, and the brakes set.
- 8.12 Maintain a safe distance from the edge of elevated ramps or platforms. Do not use trucks to open or close freight doors.
- 8.13 Set brakes and chock wheels of trucks, trailers or railroad cars while loading or unloading. Use jacks when necessary to support an uncoupled trailer. Check flooring of vehicles for brakes or weakness before driving in.
- 8.14 Ensure there is sufficient headroom under overhead installations, lights, pipes, sprinklers, etc before proceeding through an area.
- 8.15 Use an overhead guard that will protect against the impact of small packages, boxes, bags, etc.
- 8.16 Use a load backrest extension wherever necessary to prevent a load from falling rearward.
- 8.17 Only approved vehicles may be used in hazardous locations.
- 8.18 The only vehicle that may be used for lifting personnel is one that is specifically designed and listed to do so. In addition:
- use a safety platform firmly equipped with top-mid and bottom guard rails, secured to the lifting carriage or forks;
 - provide means so the person on the platform can shut off power to the truck; and
 - provide necessary protection from falling objects.

8.19 Keep fire aisles, access to stairways and fire equipment clear.

9. PALLET JACK OPERATION

9.1 Only pallet jack operators may operate the pallet jacks.

9.2 Do not exceed the manufacturer's load rated capacity. Read the lift capacity plate on the pallet jack, if you are unsure.

9.3 Do not ride on pallet jacks.

9.4 Start and stop gradually to prevent the load from slipping.

9.5 Pull manual pallet jacks; push when going down an incline or passing close to walls or obstacles.

9.6 If your view is obstructed, use a spotter to assist in guiding the load.

9.7 Stop the pallet jack if anyone gets in your way.

9.8 Do not place your feet under the pallet jack when it is moving.

9.9 Keep your feet and other body parts clear of pallet before releasing the load.

9.10 Place the load so that it will not slip, shift or fall. Use straps, if provided, to secure the load.

10. CART OPERATION (INCLUDES FOUP/FOSB CARTS)

10.1 Do not exceed the rated load capacity noted on the manufacturer's label on the cart.

10.2 Use a spotter to help guide carts around corners and through narrow aisles.

10.3 Do not stand on a cart, or float, or use it as a work platform.

10.4 For FOUP/FOSB motorized carts, refer to the Zinter Handling Inc. Operation and Service Manual for Moto-Cart Electric Platform Truck. A copy of this manual is available from the EHS Department or the Cleanroom Managers Department.

11. HAND TRUCK OPERATION

- 11.1 Tip the load slightly forward so that the tongue of the hand truck goes under the load.
- 11.2 Push the tongue of the hand truck all the way under the load to be moved.
- 11.3 Keep the center of gravity of the load as low as possible, by placing heavier objects below the lighter objects.
- 11.4 When loading hand trucks, keep your feet clear of the wheels.
- 11.5 Push the load so that the weight will be carried by the axle and not the handles. The operator should only balance and push.
- 11.6 Place the load so that it will not slip, shift or fall. Use straps, if provided, to secure the load.
- 11.7 If your view is obstructed, use a spotter to assist in guiding the load.
- 11.8 For extremely bulky objects, strap the objects to the hand cart.
- 11.9 For pressurized items such as gas cylinders, use a hand truck designed for cylinders and secure in place with straps or chains.
- 11.10 Do not walk backward with the hand truck, unless going up stairs or ramps.
- 11.11 When going down an incline, keep the hand truck in front of you so that it can be controlled at all times.
- 11.12 Move hand trucks at a walking pace.
- 11.13 Store hand trucks with the tongue under a pallet, shelf, or table.
- 11.14 Do not exceed the manufacturer's load rated capacity. Read the capacity plate on the hand truck, if you are unsure.

12. GENERAL TRAVELING PROCEDURES

- 12.1 Observe traffic regulations and speed limits. Maintain approximately three truck lengths from the truck ahead. Keep the vehicle under control at all times.
- 12.2 Do not pass at intersections, blind spots or other dangerous locations.

- 12.3 Slow down and sound the horn at cross aisles and where vision is obstructed. If the load obstructs forward view, the operator must travel with the load trailing.
- 12.4 The operator must watch where he or she is going.
- 12.5 Grades must be ascended or descended slowly.
- 12.6 Where the grade is greater than 10 percent, loaded trucks must be driven with the load facing upgrade.
- 12.7 On all grades, raise the load or load-engaging means only as much as necessary, and tilt back if applicable.
- 12.8 The vehicle must be kept within a speed limit that will permit it to be stopped safely. Maintain indoor speed under 5mph (8km/hr) and outdoor speed under 15mph (24km/hr).
- 12.9 Stunt driving or horseplay is not permitted. Those engaged in this type of activity are subject to disciplinary action.
- 12.10 The operator must slow down for wet and slippery floors.
- 12.11 Properly secure dock-boards or bridge-plates, drive over them slowly and carefully and never exceed their rated capacity.
- 12.12 Approach elevators slowly and enter squarely after the car has been leveled. On an elevator, neutralize the controls, shut off the power and set the brakes.
- 12.13 Motorized hand trucks must enter elevators or other confined areas with the load end forward.
- 12.14 Avoid running over loose objects in the roadway and aisles.
- 12.15 While negotiating turns, speed must be reduced to a safe level by means of turning the hand steering wheel in a smooth sweeping motion. Except when maneuvering at a very low speed, the hand steering wheel must be turned at a moderate, even rate.

13. GENERAL LOADING PROCEDURES

- 13.1 Only stable or safely arranged loads must be handled.
- 13.2 Only handle loads within the rated capacity of the truck.
- 13.3 Loads that are long or high enough to affect capacity must be adjusted.

- 13.4 Trucks with attachments must be operated as partially loaded, even when empty.
- 13.5 Place the load-engaging means as far as possible under the load. Tilt the mast backward carefully to stabilize the load.
- 13.6 When tilting the load, use extreme care particularly when high tiering. Do not tilt forward with the load-engaging means elevated, except to pick up or deposit a load. When stacking or tilting, use only enough backward tilt to stabilize the load.

14. GENERAL SERVICING PROCEDURES

- 14.1 When trucks need servicing, repair, or are defective or unsafe in any way, they must be removed from service until repaired.
- 14.2 Do not refuel a vehicle inside the building.
- 14.3 Do not fill fuel tanks while the engine is running. Do not spill fuel.
- 14.4 Any oil or fuel spills must be cleaned or soaked up; and the fuel tank cap replaced before the engine is restarted.
- 14.5 Do not operate a vehicle with a leak in the fuel system.
- 14.6 Do not use open flames to check electrolyte levels in storage batteries or gasoline levels in fuel tanks.

15. GENERAL MAINTENANCE

- 15.1 If at any time a powered industrial vehicle is found to be in need of repair, defective, or in any way unsafe; the truck shall be taken out of service. The keys are removed and tagged with an "Out of Service" or "Danger Do Not Operate" tag, until it has been restored to a safe operating condition by an authorized person.
- 15.2 Industrial vehicles shall be examined before each use and shall not be placed in service, if the examination shows any condition adversely affecting the safety of the vehicle.
- 15.3 Industrial vehicles shall have a preventive maintenance check done yearly, or in accordance with the manufacturer's recommended frequency, by a qualified repair person.
- 15.4 All parts of an industrial vehicle requiring replacement shall be replaced only by parts equivalent in safety to those used in the original design.

- 15.5 Industrial vehicles shall not be altered so that the relative positions of the various parts are different from what they were when originally received from the manufacturer. They shall not be altered either by the addition of extra parts not provided by the manufacturer or by the elimination of any parts, unless approved by the manufacturer.

16. CHANGING AND CHARGING STORAGE BATTERIES

- 16.1 Battery charging must be done in designated areas. Designated maintenance areas on the CNSE site: Behind the NanoFab South Annex (NFSX) in the loading dock area and in front of the Central Utility Building (CUB).
- 16.2 Battery charging areas must be provided at the facility for flushing and neutralizing spilled electrolyte, for fire protection, for protecting charging apparatus from damage by vehicles and for adequate ventilation.
- 16.3 Material handling equipment must be provided for handling batteries. A conveyor, overhead hoist or equivalent material handling equipment must be provided for handling batteries over 50lbs.
- 16.4 Properly position and secure reinstalled batteries in the vehicle.
- 16.5 Provide a carboy filter or siphon for handling electrolyte.
- 16.6 Pour acid into water, not water into acid.
- 16.7 Vehicles must be properly positioned and brakes applied before attempting to change batteries.
- 16.8 When charging batteries, keep vent caps in place to avoid electrolyte spray (make sure vent caps are functioning), and open the battery cover to dissipate heat.
- 16.9 Smoking is prohibited in the charging area.
- 16.10 Take precautions to prevent open flames, sparks or electric arcs in battery charging areas.
- 16.11 Keep tools and other metallic objects away from the top of uncovered batteries.
- 16.12 Old batteries should be recycled to the vendor. Contact the EHS Department for proper recycling of batteries.
- 16.13 In areas where powered industrial vehicle batteries are charged but no maintenance is performed, where no batteries are removed from the

trucks and no electrolyte is present, only the requirements in (16.1, 16.8, 16.9, 16.10, 16.11 and 16.13) are applicable. Personal protective equipment must still be used when and where required.

17. RECORDS

- 17.1 All inspection records and maintenance reports shall be kept on file by the owner of the powered industrial vehicle.
- 17.2 EHS shall maintain records of training for individuals required to operate powered industrial vehicles.
- 17.3 Those individuals required to operate powered industrial vehicles must attend training upon initial assignment, and every 3 years or more frequently, if an incident occurs that deems retraining necessary.
- 17.4 Persons qualified to transport chemicals via forklift must have had EHS training in Chemical Handling (EHS-00005) and Personal Protective Equipment (EHS-00010).