



STORAGE OF MATERIAL

IO2 – EDUCATIONAL MATERIALS



Storage of Material

Storing materials involve diverse operations such as:

- Hoisting tons of steel with a crane;
- Driving a hand pallet loaded with solid wires;
- Stick electrodes;
- Transport gas cylinders manually;



Figure 1 – Storage. Source:
http://www.wusee.com/index.php?_m=mod_product&_a=view&p_id=385

Storage of Material

The efficient storing of materials are vital to industry.

In addition to raw materials, these operations provide a continuous flow of parts and assemblies through the workplace and ensure that materials are available when needed.

Unfortunately, the improper storing of materials often result in costly injuries.

Storage of Material

- Store materials in a planned and orderly manner that does not endanger employee safety.
- Ensure stacks, tiers, and piles are stable and stacked to aid safe handling and loading.
- Store hazardous materials in accordance with the individual requirements.
- Store all materials on pallets to discourage rodent infestation. Immediately clean up spills and leaks that create such rodent habitat.
- Use slings to hoist bagged material, lumber, bricks, masonry blocks, and similar loosely stacked materials only if the slings are fully secured against falling by straps, sideboards, nets, or other suitable devices.

Storage of Material

Storing Materials in an Open Yard:

- Storing materials in an open yard requires attention to combustible materials, access, powerlines, and fire protection.

Combustible Materials:

- Stack combustible materials securely. Stacks or piles must be no more than 4,9m feet high. Store combustible material at least 3m away from a building or structure.

Storage of Material

Access:

- Driveways between and around combustible storage piles must be at least 4,5m wide. Keep them free from accumulations of material or rubbish. Use a map grid system of 15 by 45m when planning driveways in open-yard combustible material storage areas.

Powerlines:

- Do not store materials under power lines or where materials may block egress or emergency equipment.

Fire Protection:

- Provide portable fire extinguishing equipment rated 2-A:40-B:C at accessible marked locations in the yard so that the nearest extinguisher is no more than 50 feet away for a Class B hazard or 75 feet away for a Class A hazard.

Requirements for Storing Materials Indoors

Storing materials indoors requires attention to access, fire prevention and protection, floor loading, and overhead hazards. Buildings under construction require special precautions.

Access:

- Place or store materials so they do not interfere with access ways, doorways, electrical panels, fire extinguishers, or hoistways. Do not obstruct access ways or exits with accumulations of scrap or materials. Aisles must be wide enough to accommodate forklifts or firefighting equipment.

Requirements for Storing Materials Indoors

Fire Prevention:

- When storing, handling, and piling materials, consider the fire characteristics. Store noncompatible materials that may create a fire hazard at least 7,6m apart or separate them with a barrier having at least a 1-hour fire rating. Pile material to minimize internal fire spread and to provide convenient access for firefighting.

Fire Doors:

- Maintain a 60cm clearance around the travel path of fire doors.

Sprinklers:

- Maintain at least 45cm clearance between stored materials and sprinkler heads.

Requirements for Storing Materials Indoors

Heating Appliances:

- Maintain at least a 90cm clearance between stored materials and unit heaters, radiant space heaters, duct furnaces, and flues or the clearances shown on the approval agency label.

Fire Protection:

- Emergency fire equipment must be readily accessible and in good working order.

Floor Loading:

- Conspicuously post load limits in all storage areas, except for floors or slabs on grade.

Buildings Under Construction:

- Store materials inside buildings under construction at least 1,8m away from any hoistway or inside floor openings, and 3m away from an exterior wall that does not extend above the top of the material stored.

Requirements for Storing Reinforcing, Sheet, and Structural Steel

Stack steel to prevent sliding, rolling, spreading, or falling.

Use lagging (sleeve) when steel is handled by a crane or forklift to aid safe rigging.

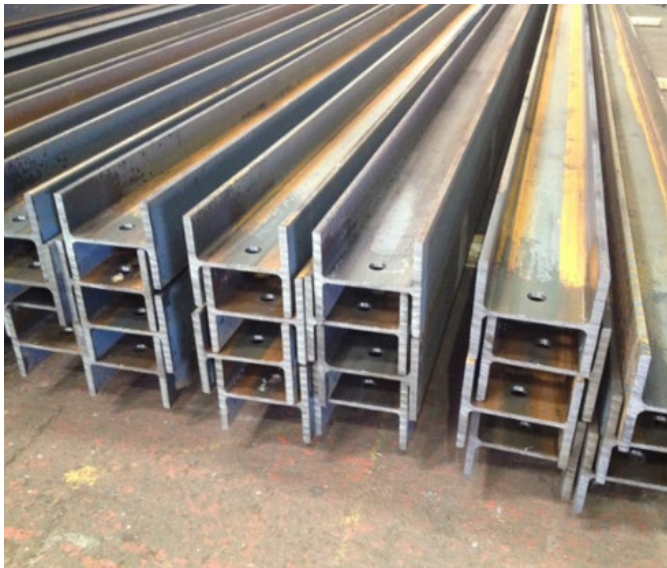


Figure 2 -galvanised steel beams.
Source:<http://www.rsj.co.uk/rsj-beams>



Figure 3 -steel plate. Source:
<https://www.indiamart.com/proddetail/astm-a36-steel-plate-15569849348.html>

Requirements for Storing Pipe, Conduit, and Cylindrical Material

Make sure cylindrical materials are stable when storing.



Figure 4 -steel pipe storage. Source: <https://www.pipesteelchina.com/metal-pipes/steel-pipe-storage-knowledge.html>



Figure 5 - steel pipe storage. Source: <http://www.lonwow.com/ERW-pipe-case.html>

Requirements for Storing Pipe, Conduit, and Cylindrical Material

- **Stacking.** Place pipe, conduit bar stock, and other cylindrical materials in racks or stack and block them on a firm, level surface to prevent spreading, rolling, or falling. Use either a pyramided or battened stack. Step back battened stacks at least one unit per tier and securely chock them on both sides of the stack.
- **Removal.** Remove round stock (e.g., wood poles, pipe, and conduit) from a stack from the ends of the stock.
- **Unloading.** Unload carriers so that employees are not exposed to the unsecured load.
- **Taglines.** Use taglines when working with round stock.

Welding consumables: Storage

All welding materials that can be damaged by moisture

(electrodes, wires and fluxes) shall be kept in a dry, well ventilated store.

For this purpose storage cabinets or rooms shall be established in the welding material control and issue center(s).

The temperature in the cabinets and rooms shall be maintained at least 10°C above ambient in order to keep the relative humidity below 60%.



Figure 6 - Welding area. Source:
<https://www.gottisrl.com/processing/welding-non-destructive-testing>

Welding consumables: Storage

For the distribution of welding materials to the various areas of consumption on the construction site, a (number of) welding material issue station(s) shall be set up.

These will be equipped with holding ovens operating at a temperature of between 130°C and 150°C for storage of low hydrogen electrodes.



Figure 7 - Storage room. Source:
<http://www.santek.com.tr/Page.aspx?l=e&id=18>

Shielding Gases: Storage

- Full cylinders of gases shall be stored upright and firmly fixed to prevent damage.
- All cylinders will be stored in locked cylinder sheds.
- Empty cylinders should be stored separately.
- The Company Site QA Manager is entitled to check storage methods and conditions at any time, and to advise where the need arises.



Figure 8 - Gas cylinder. Source:
<https://veterinariancolleges.org/gallery/gas-bottle-storage-cabinet.html>

Shielding Gases: Storage

- Check your fire code for guidelines regarding the storage of flammable gas cylinders.
- Store cylinders in a clearly identified, dry, well-ventilated storage area that is not exposed to heat or the direct rays of the sun, and away from doorways, aisles, elevators, and stairs.
- Post "no smoking" signs in the area.
- Store cylinders, both empty and full, in the upright position and secure with an insulated chain or non-conductive belt.
- During storage, close the cylinder valves with the protective caps in place.

Shielding Gases: Storage

- With outside storage, place on a fireproof surface and enclose in a tamper-proof enclosure.
- Protect cylinders from contact with ground, ice, snow, water, salt, corrosion, and high temperatures.
- Protect cylinders from falling. Use a chain or adequate support system. Consider securing each cylinder separately to prevent other cylinders from falling when items are removed from storage.

Shielding Gases: Storage

- Store oxygen cylinders and fuel gas cylinders separately. Indoors, separate oxygen from fuel gas cylinders by at least 6.1 m, or by a wall at least 1.5 m high with a minimum half-hour fire resistance. (From: CSA W117.2-12 (R-2017) "Safety in welding, cutting and allied processes". Local jurisdiction requirements may vary.)
- Cylinders must also be separated away from flammable and combustible liquids and from materials that easily ignite (such as wood, paper, oil, grease, etc.) by similar requirements as oxygen cylinders (6.1 m, or a fire wall at least 1.5 m high with ½ hr fire resistance).

Shielding Gases: Storage



Figure 9 – Warning Sign. Source:
<http://cerev.info/addwthis-warning-no-entry-without-authorization.htm>



Figure 10 – Storage of gas cylinders.
<https://smah.uow.edu.au/content/groups/public/@web/@ohs/documents/doc/uow136686.pdf>

Shielding Gases: Storage – “Out of Service Cylinders”

- Mark or label them as "**Empty cylinder**" and store empty cylinders away from full cylinders.
- Return empties to the supplier.
- Remove regulators when not in use and store these away from grease and oil. Put protective caps on the fittings when in storage.
- Keep cylinders and fittings from becoming contaminated with oil, grease or dust.
- Do not use a cylinder that is not identified or if the label is not legible. The colours of industrial gas cylinders are not standardized.

Shielding Gases: Storage – “Out of Service Cylinders”



Figure 11 –Sign. Source:
http://www.safetysupplywarehouse.com/Gas_Cylinder_Signs_Labels_s/75.htm

Storage of Material

- Keep work and storage areas clean and orderly and in a sanitary condition.
- Keep stairways, access ways, and exits free from scrap, supplies, materials, or equipment.
- **Segregation of Materials and Waste.**
- Consider storage segregation precautions for all materials.
- Use MSDS to determine appropriate storage segregation. Identify and label segregated material containers.

Storage of Material

In addition to training and education, applying general **safety principles**—such as proper work practices, equipment, and controls—can help reduce workplace **accidents involving the storing of materials**.

Whether moving materials manually or mechanically, your employees should know and understand the potential hazards associated with the task at hand and how to control their workplaces to minimize the danger.



Figure 12- Occupational safety and health poster. Source: <https://www.worldsteel.org/publications/infographics/safety-and-health-infographics.html>

Avoid storage hazards

Stored materials must not create a hazard for employees. Employers should make workers aware of such factors as the materials' height and weight, how accessible the stored materials are to the user, and the condition of the containers where the materials are being stored when stacking and piling materials. To prevent creating hazards when storing materials, employers must do the following:

- Keep storage areas free from accumulated materials that cause tripping, fires, or explosions, or that may contribute to the harboring of rats and other pests;
- Place stored materials inside buildings that are under construction and at least 1,8m from hoist ways, or inside floor openings and at least 3m away from exterior walls;
- Separate noncompatible material;

Basic Safety and Health Principles

Employers can reduce injuries resulting from storing materials by using some basic safety procedures such as adopting sound ergonomics practices, taking general fire safety precautions, and keeping aisles and passageways clear.



Figure 13 - warehouse ergonomics. Source: <http://brookejasmine.co/warehouse-ergonomics-guide.html>



Figure 14 – Warehouse. Source: <https://www.onorled.com/led-products/apolo-ufo-led-highbay-light-2/120w/>