Occupations and Workplaces

Scrap Metal Recycling

On this page

What is a scrap metal recycling facility, and what do they do?

A scrap metal recycling facility accepts scrap metal from the public, industry, and scrap metal dealers.

Scrap metal comes from primary processing, mill scrap, used construction beams, pipes, wiring, old automobiles and parts, railroad or car scrap, and many more sources.

Scrap metal recycling facilities purchase, sort, and process all types of scrap metal. They also can prepare, package, and sell various grades of ferrous and non-ferrous scrap metal.

What are the different kinds of scrap metal?

Generally, scrap metal is divided into ferrous (contains iron) and non-ferrous metals.

Common ferrous metals include alloy steel, cast iron, wrought iron, and structural steel (also known as carbon steel). Due to the high carbon content in ferrous metals, they are more susceptible to rust when exposed to moisture, except wrought iron and stainless steel. Most ferrous metals are magnetic.

Non-ferrous metals include aluminum, copper, brass, lead, zinc, tin, gold, and silver. They are more malleable (can be hammered into thin sheets) than ferrous metals and are more resistant to rust and corrosion. Non-ferrous metals are not magnetic. They make up many electronics and wires.

The scrap metal recycling industry has developed specifications and grading systems to make sure the consistent quality of materials. Commonly used standards include:

- The Scrap Specifications Circular – U.S. Institute of Scrap Recycling Industries, Inc.
- The European Classification for Non-Ferrous Scrap Metals
- The Standards Classification for Non-Ferrous Scrap Metals – U.S. National Association of Secondary Materials Industries, Inc.

What happens during the scrap metal recycling process?

Recycling metals involves a multi-step process that begins with the loading and unloading of scrap metal, separating, breaking and cutting, compacting and shredding, melting, and applying chemical processes to recycle the metals. Below, we review each step in more detail.

Loading and Unloading

Scrap metal is transported to the facility to be sorted and processed. Scrap metal can be separated by light and heavy vehicles, stationary or mobile cranes, conveyors, and other large equipment.

Separating

The sorting is often done through an automated process; however, some metals must be sorted by hand. Some metals may cause skin irritation, or there may be another substance on the metal that may result in adverse health effects. In addition, scrap metal may have sharp or abrasive edges which may cut or puncture the worker.

Breaking and Cutting

Breaking the size of the scrap metal into smaller, more manageable pieces usually involves manual labour or the use of a cutting torch. Cutting torches use gas, plasma, or powder. For more information on cutting, please see our OSH Answers – Welding Fumes.

Mechanical and hydraulic shears may also be used to cut scrap metal. Hydraulic shears can stop instantly and are generally safer for the operator. Two types of hydraulic shears include alligator shears and guillotine shears. Workers must remain at a safe distance from the moving parts. These shear machines are often operated with a foot pedal or other pressure sensor that will automatically stop the movement of the machine when released.

Compacting and Shredding

Balers use hydraulic systems to compress scrap metal. Guards should be installed around any compacting equipment or shredder to make sure that workers cannot come in contact with moving parts. There may be sensors installed that either detect heat from a person in the area to shut off automatically or may have other automatic stopping sensors. Shields or other guards should also be installed to prevent projectiles from ejecting from the equipment. This process may also produce dust, and controls should be considered to reduce worker exposure.

Melting

Scrap metal recycling often uses furnaces to melt the scrap metal. Melting not only burns off non-metal substances but also separates the different metal components. This process will increase the purity of the scrap metal for resale.

Melting metals and other materials emits fumes, vapours, smoke, and other by-products of combustion. Various filters and exhaust ventilation can be used to limit contaminants in the vicinity. Scrubbers and other electrostatic precipitators can be used to filter the air before exhausting it outside the facility, away from intake vents and working areas. Always check with the government authority responsible for environmental protection in your jurisdiction for acceptable environmental emission limits.

Applying Chemical Processes

Chemical processes to recycle metals include electrorefining, plating, leaching, chemical separation, galvanizing, etc.These processes are used to further separate the scrap into its component metals or to clean metals by removing contaminants such as paint before further processing. These processes introduce additional hazardous products to the workplace and potential by-products from the reaction.

What are some health and safety hazards for people working in scrap metal recycling?

There are many hazards workers may be exposed to when working with scrap metal. Some of these include:

- Breaking and cutting scrap metal
- Exposure to hazardous products, including those covered by the Workplace Hazardous Materials Information System (WHMIS)
- Exposure to air contaminants and process by-products, or particulates such as dusts and fumes
- Hot work
- Thermal stress
- Lockout/tag out
- Radiation
- Electricity
- Hazardous energy(e.g., gravitational, hydraulic, electrical, mechanical)
- Dermatitis or allergic contact
- Noise exposure
- Slips, trips, and falls
- Stress
- Shift workor extended work days<
- Working in a standing position
- Working in a seated position
- Heavy equipment operation
- Sharp edges or jagged metal

In addition to some of the hazards listed above, pain or injury from physical overexertion,repetitive manual tasks, or working inawkward positions is common.

A less common yet very serious hazard includes the presence of munition. On occasion, scrap may have items that resemble munition (such as weapons or ammunition). Munition is a hazard when there is an unexploded ordnance. Workers who may come in contact with unexploded ordnances must be trained on how to recognize the hazard and the protocols to safely handle the munitions and ordnances of concern. Protocols should include emergency procedures such as evacuating the area, calling explosives experts to deem the scrap metal safe, or having it disposed of properly.

What are some safety considerations for workers at scrap metal recycling facilities?

Hazard controls are critical for the protection of workers. When considering the hierarchy of controls, always look to eliminate the hazard or substitute the hazard for a less hazardous option. Note that changing the process may introduce new hazards, and a risk assessment should be conducted before implementing any control.

In the context of scrap metal recycling, the elimination of certain hazards occurs by not allowing certain materials from entering the facility. Substitution may include using a less hazardous product in the chemical separation process or using hydraulic shears instead of torch cutting for processes where hazardous fumes such as hexavalent chromium can be produced with heat.

Engineering controls include pressure or heat sensors that automatically shut off any machinery if a person is too close. Other controls include guards for any projectiles, pinch points, and furnaces. Ventilation used to limit airborne contaminants is also an engineering control.

Administrative controls such as safe work procedures must be established for the tasks to provide workers with step-by-step instructions on the process and any hazards and their control measures. For example, it may be required that all tanks or reservoirs are emptied before cutting or compacting, or that gasoline must be removed from gas tanks before compacting the automobile.

Equipment maintenance programs are also an administrative control. Scrap metal may damage machines or equipment, especially when being cut. Periodic maintenance is required to make sure all machinery and equipment are in good working order. In addition, pre-operational inspections should be conducted by the operator before use to make sure everything is running correctly.

A medical monitoring program may be required for workers exposed to specific substances such as lead or arsenic through the melting process. Medical monitoring can detect exposure to these substances early to remove an exposed worker from the area and evaluate current controls.

Training is also an important component of worker health and safety. Workers must be trained on the equipment they are required to use, WHMIS, and the safe use and proper fit of personal protective equipment.

Personal protective equipment (PPE) is the last line of defence against hazards in the workplace. Workplaces should conduct a risk assessment to determine the appropriate PPE for the job. Protective equipment may include protective footwear, high-visibility safety apparel, head protection, eye protection, and hand protection. Depending on the job or tasks, additional PPE may be required.

What are some items often not allowed when recycling scrap metal?

Depending on the location and the recycling facility, different guidelines will apply.

Generally, any compressed gas cylinders, contaminated or sealed drums and tanks, hazardous waste products, e-waste such as computers and electronics, printer cartridges, or non-metal items such as pallets or tires will not be accepted. In addition, any equipment that may contain radioactive materials (such as hospital equipment), or munitions waste (such as military shells and artillery rounds) is also not accepted.

Other home appliances such as air conditioners or refrigerators may be accepted if there is proper documentation indicating that all coolant or other hazardous products have been properly removed.

Always verify with your local scrap metal recycling facility about the types of materials that are accepted. Other services for recycling, such as electronics, may be available through your municipality.

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