

Types, Sources, and Hazards of Energy. Attachment 9.3

Energy Type	Sources	Exposure Sign & Symptoms
<p>Mechanical (Kinetic) - The energy resulting from moving machinery parts such as wheels, springs, or elevated parts, flywheels, rotating fan belts or turbines</p>	<p>Energy resulting from moving equipment parts (fans, belts, etc.) or movement of elevated equipment. Other examples include rotating flywheels and spinning shafts that create both a contact hazard and point of operation hazard (a spinning flywheel on a press could cause a press cycle when working on the clutch controls).</p>	<p>Hazards associated with forms of kinetic energy include caught in, caught on, and caught between situations for employees. Contact with equipment has the potential to cause burns, lacerations, and bodily injury. which can cause crushing, pinching, cutting, snagging, striking, or extreme sound</p>
<p>Mechanical (Potential) - The energy contained in equipment or machine components under tension or pressure.</p>	<p>Energy resulting from suspended loads, compressed or coiled springs, flywheels or parts under pressure Equipment may release energy unexpectedly if not blocked, or energy dissipated. Spring may uncoil and set equipment into motion or objects at height fall unexpectedly.</p>	<p>Hazards associated with potential energy include the uncontrolled release of this energy that can cause machinery components or materials to go ballistic and cause punctures or penetration injuries, dismemberment, or caught between situations.</p>
<p>Gravitational (Potential) - The energy is related to the mass of an object and its distance from the earth (or lower level).</p>	<p>Examples include a heavy pendulum or weight released from a height, equipment staged at a high level, a vehicle on jacks or sloped surface, or failure of springs, pins or linkage, etc.</p>	<p>Heavy objects at elevated heights may suddenly drop. Workers exposed to energy may be crushed or struck by falling objects.</p>
<p>Stored Energy - Similar to gravitational where energies are stored in components or equipment.</p>	<p>Examples include energy stored in batteries and capacitors.</p>	<p>Exposure to equipment may release energy if improper tools are used or a worker becomes part of circuit. If exposed workers may be electrocuted or be severely burned.</p>
<p>Pressure (Hydraulic) - Energy that is stored within pressurized liquids or energy created by a liquid moving in a confined space under pressure.</p>	<p>Fluids are usually water or oil in accumulators or lines, hoses, pumps, valves, or actuators. Hydraulic energy performs work through two major routes: cylinders and pumps Examples include vehicle lifts, power presses, reserves on forklifts, and buckets, or injection mold equipment</p>	<p>Hazards associated with hydraulic energy include the potential for crushing and injuries due to the exposure to high-pressure fluid leaks. Workers may be struck by moving machinery, equipment or other items. Pressurized liquid may burn or cut the skin. Amputation and injection of hydraulic fluid into body tissue are additional hazards.</p>
<p>Pressure (Pneumatic) - Energy that is contained or operated by air or gas under pressure.</p>	<p>Examples include air found in pumps, valves, actuators, pressure vessels, sprayers, air compressors and pipe purging systems.</p>	<p>Hazards associated with pneumatic energy include the potential for crushing and injuries due to exposure to high-pressure air. Additional hazards include injection of air into the bloodstream that can result in crippling and death due to air embolism, as well as injection of particulates into body tissue. Fluids or air may get into the eyes, skin, or mouth. Pressure in hoses or lines may whip or strike workers if not latched.</p>

Types, Sources and Hazards of Energy cont'd

Energy Type	Sources	Exposure Sign & Symptoms
<p>Thermal - Heat energy from heated water, oil, liquified gases that warm or heated objects (pipes, equipment, etc.). Thermal energy involves both hot and cold systems and the transfer of energy through mediums.</p>	<p>Sources include welding, torch work, chemical reactions, heat exchangers, environmental chambers, boilers, and cryogenic systems. Boiler or cafeteria equipment may contain chilled or hot water, or steam.</p>	<p>Temperatures above 113 F and below 39 F can cause serious to severe damage to human tissue Exposure to thermal energy may result in severe thermal burns, blisters, heat stress, frozen tissue or skin irritations.</p>
<p>Chemical - The energy released when a substance undergoes a chemical reaction or an exposure such as combustible fuel, or irritating treated liquids.</p>	<p>Examples include plating tanks and associated piping and chemical storage tanks, also chemicals in contact with incompatible materials, air, or water.</p>	<p>Exposure to chemicals can be irritating, asphyxiant, explosive or other hazardous reactions. When released chemicals can cause harm to respiratory, skin, eyes, hands or other body parts. Heat of reaction, uncontrolled reactions, fires and explosions are the primary hazards with chemical energy</p>
<p>Electrical - Electrical energy results from the existence of or moving charged particles such as electrons or protons) either statically as an accumulation of charge or dynamically as a current.</p>	<p>Energized equipment includes circuit panels, transistors, motors, lights, controls, heaters, outlets or other equipment using electricity.</p>	<p>Electrical hazards result from exposure to 50 V or greater. Hazards associated with electrical energy include the potential for electrocution and injuries, primarily burns, due to the discharge of current through the body, arcing of the electrical energy, or falls (secondary effect),</p>
<p>Industrial Piping Systems - Liquids or gases in industrial pipes, boilers, or other systems that transfer fluids or gas.</p>	<p>Industrial piping systems include pipes, valves, pumps and vessel transporting or storing material under pressure, greater or less than atmospheric (normal) pressure. Pipes or lines may contain hazardous chemicals (e.g., ammonia, oxygen, natural gas, chlorine, water treatments) petrochemicals, biohazards or other naturally occurring materials.</p>	<p>Release of water, chemical or gas from pressurized piping systems may cause injuries including burns, scalds, fires, asphyxiation, explosions, poisonings respiratory diseases, or other severe injuries. Pressure sprays can cause large area injuries, or damage. Gases can expand reducing available oxygen. Releases may also create environmental incidents.</p>
<p>Radiation - The emission and propagation of waves or particles.</p>	<p>Sources may include x-ray units, radioactive material in equipment or waste discharge. Sources are rare. Contact EHS for assistance.</p>	<p>Irradiation or exposure to alpha, beta, or gamma particles that can cause radiation burns, radiation sickness, and death.</p>