

LOS ANGELES UNIFIED SCHOOL DISTRICT  
DIVISION OF ADULT AND CAREER EDUCATION  
SAFETY INSTRUCTION  
INDUSTRIAL EDUCATION – AUTO MECHANICS

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## **GENERAL SAFETY INSTRUCTIONS**

### **1) THINK SAFETY .....AND PASS THE SAFETY TEST**

- a) You are individually responsible for putting safety first. Make up your own mind to put safety first. Be ready and willing to learn how to work safely. Your life may be at stake! More accidents are caused by unsafe acts of people than by unsafe conditions.
- b) Before working with any machine, equipment, or tool, you must receive safety instructions, pass the safety test, and be sure that an instructor is present in the shop.
- c) Look for, read, and obey all the warning signs posted in the shop. They are placed there to call your attention to possible dangers.
- d) Become familiar with the school's fire signal, fire drill procedures, and fire exits. In case of fire alarm, turn off all power and flames and walk quietly to the nearest exit. Follow the instructor's directions.

### **2) REPORT TO YOUR INSTRUCTOR WHENEVER:**

- a) Any student, including yourself, feels ill or has even the slightest injury, accident, burn, or electric shock.
- b) You see anyone breaking a safety rule, such as clowning, running, snapping rags, playing around, or otherwise acting in an unsafe manner. A playful push may cause a fall and injure someone.
- c) You find a faulty tool, questionable equipment, or a safety guard removed from a machine. Report any machine that is out of adjustment or in need of repair, or any unsafe shop condition. Take damaged or broken tools to your instructor. Tag the tool as unsafe. Report any machine that does not operate correctly.

### **3) ASK YOUR INSTRUCTOR'S PERMISSION BEFORE:**

- a) You are permitted to work with any power tool or test equipment only after you have been given safety instructions. Every machine is dangerous if operated incorrectly. You must be instructed on safe operation.
- b) You are not permitted to work with any machine or equipment before, during, or after class hours unless you have received permission and there is an instructor in the shop or project area. Should you or any other student get injured, report it to the instructor immediately.
- c) Always obtain the instructor's permission before starting or road-testing a car, test-running an engine, working under a car, using a battery charger, jacks, lifts, hoists, or overhead cranes. Also check with the instructor before making safety checks on brakes, front end, or tires.

#### 4) WEAR PROTECTIVE CLOTHING

- a) **It is mandatory to wear safety goggles or a face shield** to protect your eyes and face from sparks, flames, blinding light, solvents, soldering fluxes, chemicals, battery acid, brake fluid, air conditioning refrigerants, or particles from air hoses, grinders, or buffers. California OSHA law states that "Eye protective devices shall be worn...while repairing or servicing any project or operating any machinery or equipment" (refer to DACE bulletin #53).
- b) All loose clothing and hair should be tucked out of danger from being caught in wheels, drive belts, or gears. Do not wear ties, scarves, dangling chains, or jewelry in the shop. These can get caught in moving components. All clothing worn must fit properly.
- c) When you are working on automotive electrical circuits, you must remove metal watchbands or rings. They can conduct electricity, cause burns, and damage automotive electrical systems.
- d) To protect your feet and prevent slipping and injury from falling objects or sparks you must wear oil resistant-soled shoes in good condition with full tops in the shop.
- e) Wear gloves when handling hot metal, hot manifolds, exhaust pipes, solder, chemicals, or sharp objects. Do not wear gloves when they might get caught in machinery or moving parts.

#### 5) LIFTING AND CARRYING SAFETY

- a) Grasp any object to be lifted with a firm grip and lift with your legs, not with your back. Squat down and keep your back and head in as straight a line as possible when you lift. Keep your back vertical and use your leg muscles for lifting.
- b) Get help with large or heavy objects. Make sure the path to where you are moving the object is clear. Clear the path from the area where the object is located at to the area where it is to be set down.
- c) Do not twist your body when moving or carrying heavy objects, this could cause back injury.
- d) Set objects down keeping the back and head straight and lower with your legs and not your back (in the same way that you lifted the material). Use your leg muscles and keep your back straight.

## **6) PREVENT FIRE AND BURNS**

- a) Report to your instructor any burn or shock as soon as possible. Keep hands away from open flames, hot metal, drill bits, saw blades, and any other hot objects that could result in a burn. Keep hands away from hot manifolds and exhaust pipes.
- b) Remember that there is so much gasoline to be found around auto shops that there must be **NO SMOKING** in the work area. A fire can be started very easily from gasoline. In the case of fire, follow only your instructor's directions. Know and practice the fire drill rules. Locate the exits. Smoking is not permitted on any campus in the school district.
- c) Never use or operate any equipment that generates sparks and flames near any flammable or combustible materials.
- d) Never use gasoline near flames, sparks, potential sparks, or radiators. Do not use gasoline for cleaning of any kind. Never pour gasoline into the carburetor throat while cranking the engine with the starter. This can cause dangerous backfires. Do not use your hand as a choke when the engine is being cranked or is running. This wets your hand with fuel, and you could receive a serious hand burn from a backfire.
- e) Be careful when picking up metal tools and other equipment sitting in the sun or has been used. It might be hot and could cause a burn. Be careful when draining the oil from a hot engine. Hot engine oil can cause a serious burn.
- f) Never remove a hot radiator cap. The steam could cause burns. Let the cap cool for a few minutes, then release it slowly, using a rag to protect you and your arm.
- g) Check closely for leaks around fuel lines and fittings. Do not use a droplight (only use a flashlight or florescent light). A bad fire or explosion can result from an accidental spark.
- h) Do not use paint, enamel, lacquer, or solvents near flames or sparks. They are combustible (flammable, or catch on fire easily). Read labels on containers before using, or ask your instructor for directions. Put all rags containing oil, gasoline, paint, solvents, or other similar burnable materials in covered metal containers before you leave the area.
- i) Use a battery lifter (lifting tool) to pick up or carry a battery. Immediately rinse with plenty of water and baking soda any part of your body or clothing that comes in contact with battery acid. Remember that the gas given off by a battery during changing is very dangerous, flammable and could cause the battery to explode. Turn off the battery charger while connecting or disconnecting the lead wire or cables. Keep all open flames and sparks away from the battery. Be sure there is plenty of air circulating in the shop/vehicle area.

- j) Never leave tools lying on the top of a battery. They may cause a short circuit and the battery could explode.
- k) When welding or brazing, set up the work so that the flame from the torch will not come in contact with the concrete floor. Cement will shatter under high heat. Never weld near a gas tank, gas pipe, or containers that have held gasoline or flammable: vapors are always present and can explode.

## **7) GENERAL SHOP SAFETY GUIDELINES:**

- a) Keep the floor, aisles, and passageways clear of stock, materials, scraps, tools, and equipment. Place all scrap material or cuttings in the scrap box provided.
- b) Clean up immediately any liquids or grease spilled on the floor to prevent slips and falls and to reduce fire danger.
- c) When cleaning dust or filings off tools or parts, use OSHA approved low-pressure nozzles and do not blow compressed air onto your body to clean off clothes or body parts or for any other reason. Be sure the water filter is drained before using air tools.

## **8) HAND TOOLS AND BENCH WORK**

- a) Use the right tool for the right job. Hand tools come in many shapes and sizes. Each tool is made to do only certain jobs with safety and ease. Using any available tool to "get by" is one of the main causes of hand tool accidents. Do not, for example, use a wrench as a hammer or a screwdriver as a chisel or pry bar. Use only tools that are in safe condition. Report any sub-standard or unsafe tools to the instructor.
- b) Do not throw tools or materials to another student since this can endanger eyes, hands, and body parts. Pass tools directly, with handles extended. Do not leave tools or materials projecting from a vise, workbench, or pants pockets. Other students can bump into them and they can damage the vehicle.
- c) Keep all tools clean. Do not let oil, grease, or dirt accumulate on the tool or on your hands. Avoid using wrenches with cracked, sprung, or worn jaws. A wrench slipping usually causes a painful hand injury.
- d) Recognize that right size and shape of the tool is important to the job. Every tool has a "built-in" safety limit or capacity. You will learn how to read the tables from tool manufacturers that tell each tool's "work load." Overloading a tool can easily lead to breakage and injury.
- e) Use only tools that are in safe condition. Report to your instructor when you see any that are not.

- f) Make sure that handles are used on all tanged tools such as files, chisels, and scrapers. Do not carry sharp-edged tools in your pockets. Objects can cut hands or puncture body parts during a fall.
- g) Keep sharp edged tools sharp. A dull tool is more dangerous than a sharp tool because it will slip over work or slip away from the work. It could require more pressure or be difficult to control. When using sharp-edged tools, cut away from your body. A tool facing toward you can slip and cut you. Also, be sure no one else is standing in front of your work.
- h) **Chisel or gouge:** hold a chisel or gouge with both hands unless one hand is used to drive the tool with a mallet. Sharpen chisels or plane irons carefully. Keep fingers away from cutting edges and never test the edge of the blade by drawing fingers across it. Grind off mushroomed heads on chisels, hammers, punches, and similar tools before using them. Sharp pieces from a mushroomed tool head may fly off.
- i) **Screwdrivers:** always use the appropriate size and type of screwdriver for the job. Drive screws carefully and grip the screwdriver handle tightly. To start a screw, first prepare the stock with a “starter” hole. Then set the screw in the hole before picking up the screwdriver. Do not hold small articles in the palm of the hand while tightening the screws with a screwdriver. Hold the items in a vise or support them on a bench. Screwdrivers with worn, chipped, or broken tips are dangerous. Such tools do not have enough grip on the screwhead and often jump the slot, injuring the user. Use the right kind of screwdriver with the right-sized tip for your job. If the tip is either too small or too large, it will probably slip and hurt someone.
- j) **Hammers:** make sure the hammer handle fits tightly into the head of any hammer, and be sure the handle itself is not split. Do not strike two hard surfaces together, such as a hammer head or a hammer and anvil face. When hard steel strikes hard steel, a chip may fly off like a bullet.
- k) **File:** do not use a file unless it has a handle. The tang, or pointed end of a file, is sharp and may puncture your hand unless a handle protects the end. Clean a file with a file brush rather than by taping it on the side of the bench. The file is very hard and brittle. It can break and send sharp pieces flying. Do not use a file as a pry bar.
- l) **Wrench:** use the wrench of the right size and kind for the job. A wrench or socket one size too large will not grip the corners of a nut correctly. This can cause a bad slip during a heavy pull. Do not use pliers in place of a wrench. Do not use metric in place of standard or standard in place of metric tools.
- m) Never leave tools sticking out from a vise or workbench where someone might bump against them. Carry any sharp-edged tool so the point or edge is held down toward the floor. Never carry sharp-edged tools in your

- pocket or pointing toward your body. You could slip or fall against them and hurt yourself. Never tighten an unused vise. The tightened handle may stick out into a walkway and cause injury.
- n) Avoid sliding your fingers along the edges of metal surfaces. Many metal parts have razor-sharp edges and burrs along the sides.

## **9) SHOP PRACTICE**

- a) Keep floor, aisles, and passageways clear of stock, materials, scraps, tools, and spilled liquids. Put scrap materials and cuttings in waste cans.
- b) Arrange air hoses, extension cords, machine attachments, and large parts so that no one can trip over them.
- c) Be sure that floor jacks are put out of the way with handles up and creepers are standing on end when not in use. Never ride creepers, rolling jacks, or other movable equipment.
- d) Be sure the large shop doors are open for air circulation when engines are running. Carbon monoxide fumes are odorless, colorless, tasteless, and deadly poison. The symptoms of carbon monoxide poisoning are disorientation, nausea, vomiting, headache, and/or dizziness. If you see any student with these symptoms report it to your instructor immediately.
- e) Avoid breathing spray paint fumes; they are poisonous. Spray painting should be done outside the shop or in a properly ventilated area.
- f) Disconnect battery cables before doing engine repair work or an overhaul. This will prevent dangerous short circuits and sparks.
- g) If the brakes on a car do not work, post a "no brakes" sign on the car in clear view. Block the drive wheels.
- h) Avoid working under a car while the engine is running except when necessary. Be sure the car is properly supported by a hoist. Never work under a car when exhaust fumes are blowing on you.
- i) Keep car doors closed whenever possible, even when work is being done on the inside of the car. A student crawling out from under the car may strike his or her head on the door, or a passing student might bump into an open door.
- j) Keep your arms and legs under the car while working there. If your leg is sticking out, it could trip someone, or it could be run over.
- k) Be sure the transmission is in park or neutral and the hand brake is set before starting an engine. If in doubt about the hand brake holding, block the wheels. This prevents the car from moving.
- l) Never start an engine while anyone is under the car.

- m) Prevent injury from falling objects while working under a car by first checking to see that no loose objects are lying on the fenders, bumpers, or other parts. Be careful not to drop anything on a co-worker below you.
- n) If there is any danger in starting an engine, post a "do not start" sign in clear view.
- o) Never point an air nozzle toward yourself or others. If an air nozzle is pointed toward a person, the air emitted may break an eardrum, blow particles into eyes, or cause other injuries. Never use an air hose to clean dust from your clothing. Be sure the air hose guard is on the nozzle so that the nozzle cannot be placed directly against an object or person. When using an impact wrench with a flexible socket, do not remove the socket from the nut or bolt until the wrench has stopped completely; otherwise, the flexible socket may fly off at terrific speed. Do not use a swivel adaptor on an impact wrench.
- p) Do not enter or exit a vehicle that is elevated on a hoist up in the air. Do not open a door on a vehicle elevated on a hoist. The vehicle must be lowered on the ground.

## **10) OPERATE POWER MACHINERY SAFELY**

- a) Recognize that the right size and shape of the tool is important to the job. Every tool has a "built-in" safety limit or capacity. Read the instruction manuals from the tool manufacturer. They contain information on the tool's range of workload. Overloading a tool can lead to breakage and injury.
- b) Obtain the instructor's permission before turning on any power tools or equipment. After getting your instructor's permission, you and only you, the operator, may start a power machine. The student operating any electrical equipment is called the "operator". Only you know when you are ready to begin. You are responsible for controlling the machine, staying with it, and knowing when the power should be turned off. Only the operator can start and stop the equipment. Keep your eyes and full attention on the moving parts. Keep your fingers and clothing out of the way. Make sure that all parts have stopped moving before leaving the machine after the power has been turned off.
- c) The operator should verify that other students do not crowd the machine or get too close to the operating equipment. The operator assumes control and must decide exactly what is to be done. The operator should check and verify the machine will not injure other students. Only the operator and the instructor are allowed around a machine. Avoid crowding around, and be sure the power is off if you must talk to anyone.

- d) Do not in any way distract the operator of a machine. If you start a machine, stay with it until the machine is turned off. Never leave a machine running while you go away from it. Use caution when approaching power machines. Stay away from moving parts. Never stand in the direct line or “throw” of any machine. If a machine breaks or becomes overloaded objects can be thrown out with strong force (the stock could not be held securely or knots/slivers can break loose).
- e) Use extension cords carefully. Drop the lead wire directly from the wall plug to the floor to avoid tripping over the cord. Inspect the condition of the cord, cap, and body and be sure that insulation and covering are not broken or worn. Be sure your hands are dry before touching switches or receptacles. Wet hands invite electrical conduction and can cause shocks or burns from electricity. Do not use any power tools while standing on a wet or damp floor.
- f) Before turning on the power to any tool, pick up loose tools and materials around the power tool and make certain that all other students are clear of the machines and equipment. Clean, oil or adjust machinery only when the machine is stopped and preferably when the machine is unplugged.
- g) Keep clothes, tools, cords, and loose objects away from moving parts. They can get caught in the equipment causing injury to yourself and possibly others.
- h) Check all adjustments before turning on the power. Verify that all adjustments are locked into place before starting a piece of equipment. Vibration may cause an adjustment to loosen, slip, or change position. Vibration may cause tools or other loose objects to be drawn into the moving parts, causing personal injury and damage to the equipment.
- i) Keep all sharp-edged tools sharp. A dull tool is more dangerous than a sharp one because it will slip over and away from the work, requires more pressure, and is difficult to control.
- j) Never remove guards of safety devices from any machine. They must always be in place when the tool is being used. If, for any reason, a safety guard is removed, or if the machine is defective in any way, the machine must not be used until proper authorities make corrections.
- k) Remember to wear safety goggles or a face shield whenever you use power machinery.
- l) Be sure the power is off when you are oiling, cleaning, or adjusting any type of equipment to prevent catching your hands or clothing in moving parts.

- m) Before turning the power on, be sure that:
- i) You have your instructor's permission to operate the machine.
  - ii) All guards and safety devices are in place. Never remove them.
  - iii) All adjustments are tightly locked in place because vibration can loosen them.
  - iv) Any loose tools or other objects are removed. Vibration can cause them to contact moving parts and be thrown out with terrific force.
  - v) Any frayed cord, shock or spark from electrical wires or connections are reported to the instructor.
  - vi) Your hands are dry, and the floor or surface you are working on is dry. Water conducts electricity, and wet hands or wet floors can give you a shock.
  - vii) Do not start any machine you think may have something wrong with it. Tag it as unsafe and report to your instructor any conditions you question.
  - viii) Never stand where you could be injured by material thrown by a machine.
- n) Drill Press
- i) Use the drill press vise or clamp to hold the work being drilled and prevent the drill from binding and throwing the work. While drilling grip or clamp the vise firmly to prevent the drill from breaking or revolving in a dangerous manner.
  - ii) Lessen the feed pressure as the drill cuts through the work. This will reduce the danger of the drill binding in the work and causing it to revolve. If the drill binds and the material rotates, stop the machine as soon as safely possible. Do not touch material while it is in motion.
  - iii) Always use a sharp drill which has been grounded correctly for the work. Drills that have not been properly ground may dig into the work and throw it.
  - iv) Be sure the drill is securely fastened and is centered in the chuck before turning on the power. Remove the chuck key from the chuck before turning on the power to prevent it from flying.
  - v) Be sure that sheet metal being drilled is backed up with a scrap board and is clamped to the table with a C-clamp.
  - vi) Use a face shield to prevent injury to eyes and face in case the drill breaks or hot oil and chips fly out.

- vii) Operate the drill at the correct speed for the size of the drill and the kind of material that you are using. If too much speed is used, or if the drill is forced too rapidly into the material, the drill may break.
- viii) Stop the machine before removing work, chips, or cuttings. Use a brush to remove chips to avoid deep, painful hand or arm cuts.

## **11) PORTABLE POWER TOOL SAFETY**

### **a) Drill safety:**

- i) Make sure the drill is unplugged before tightening the chuck. Keep the chuck away from loose objects and clothing. The chuck could bind in clothing and cause damage.
- ii) Be sure the drill is in the "OFF" position when it is plugged into an electric outlet, in order to prevent anything from being caught by the rotating drill.
- iii) Always hold the switch when operating the drill. Be ready to stop the drill at any time. When using a heavy-duty drill, hold the drill with both hands and brace the body securely to avoid injury. Discontinue drilling if electric sparks jump from the point of the drill to the work. This may indicate electrical grounding. Contact your instructor for further instructions.
- iv) Keep your face away from the portable electric drill. If the drill grabs, the handle is likely to swing around and hit you.
- v) Never hold in your hand the material to be drilled while you are drilling it.

### **b) Bench Grinder**

- i) Adjust the "work rests" on the grinders and emery wheels as close to the wheel as possible to prevent the work from catching between the rest and the wheel. The gap should not be greater than 1/8th inch. Clamp the work rests tightly after each adjustment.
- ii) Be sure the grinding wheel fits the arbor and is tightened securely.
- iii) Make sure the side wheel guards are in place.
- iv) Wear goggles or a face shield while using the grinder or wire wheel.
- v) Stand to one side while the grinding wheel is being dressed or started.
- vi) Grind work below the center of the wheel so that the wheel cannot throw the work.
- vii) Grind on the face of the wheel only, unless the wheel is designed for side grinding, so that the wheel will not break from side tension.

- viii) When grinding work is held in the hands, use special care to prevent the work from slipping and causing finger injuries.
- ix) Hold small pieces of material with vise grips or a small vise to prevent the work from slipping and becoming jammed in the wheel. Never use pliers or a rag.
- x) Do not push the tool or part being dressed downward between the wheel and the rest while grinding. Jamming the wheel could cause damage to the equipment and/or cause serious injury.

## **12) AXLE STANDS AND JACKS**

- a) Be sure your instructor has checked and given you permission to use any stands or jacks.
- b) Use only the jacks, hoists, or lifting machines that have the correct lifting capacity. You will learn how to find out the different capacities of each of these.
- c) Block the wheels on the opposite end of any car before jacking. Be sure to check with the instructor before blocking wheels in raising a car. He or she will instruct you according to the type of equipment to be used.
- d) Be sure the jack is located under the part to be raised and at a strong section of the car, especially if the body is of unit construction.
- e) Place the jack on a clean, solid, level surface.
- f) If the jack is used under an axle, make sure the lifting pad is in proper position to prevent slipping.
- g) Never crawl under a car that is supported only by a jack.
- h) Make sure that axle stands of the same height are used.
- i) If any hydraulic jack has an oil leak, notify the instructor right away.
- j) After raising the car, leave the jack handle in a straight-up position. This helps prevent a person from tripping over it or from accidentally releasing the shut-off valve.
- k) Lower a car slowly when using a hydraulic jack.

## **13) ARBOR AND HYDRAULIC PRESSES**

- a) Make sure the work is solidly supported on the press table and that the work is lined up correctly. A slip is dangerous.
- b) After each table adjustment, make sure the supporting pins are properly placed so that the work set-up will not collapse. Make sure that all tension is off the table while adjusting cables. Keep the work in a straight upright position, or it may "kick-out" under pressure.

- c) Keep hands away from the pressure ram and the work at all times. When pressure is applied, the work may slip. Use the proper tool or adapter for pressing bearings on the end of a shaft.
- d) Be sure the ratchet engages the gear before applying pressure on the arbor press. A slipping ratchet is dangerous.
- e) Because the hydraulic press multiplies handle pressure greatly, watch the pressure gauge very carefully when the ram comes in contact with the work. Only a little effort by the operator can damage the work.
- f) Remember that only the operator should be near the hydraulic press when it is in use. Stand to one side of the work to avoid being hit if the work slips and flies out when pressure is applied.