**Section 220.40 Safeguard For Mechanical Equipment**

a) Mechanical equipment guards.

1) Gears, sprockets, chains, drive, head, tail, and takeup pulleys, flywheels, couplings, shafts, sawblades, fan inlets, protruding set screws on revolving parts, and similar exposed moving machine parts which may be contacted by persons, and which may cause injury to persons shall be guarded. Guards shall be sufficiently strong and maintained to provide the required protection.

2) Overhead belts shall be guarded if the whipping action from a broken line would be hazardous to persons below.

3) Guards at conveyor-drive, conveyor-head, and conveyor-tail pulleys shall extend a distance sufficient to prevent a person from reaching behind the guard and becoming caught between the belt and the pulley.

4) Except when testing the machinery, guards shall be securely in place while machinery is being operated.

b) Stationary grinding machines; protective devices.

1) Stationary grinding machines other than special bit grinders shall be equipped with:

A) Peripheral hoods (less than ninety degrees (90 ) throat openings) capable of withstanding the force of a bursting wheel;

B) Adjustable tool rests set as close as practical to the wheel; and

C) Safety washers.

2) Grinding wheels shall be operated within the specification of the manufacturer of the wheel.

3) Face shields or goggles, in good condition shall be worn when operating a grinding wheel.

c) Tools-hand and power; general requirements.

1) All hand and power tools shall be maintained in safe condition. Defective tools shall be removed from service.

2) Hand-held power tools shall be equipped with controls requiring constant hand or finger pressure to operate the tools or shall be equipped with friction or other equivalent safety devices as approved by an authorized representative of the Mining Board.

d) Power-operated hand tools.

1) Electric power-operated tools.

A) Electric power-operated tools shall either be a double-insulated type approved by a nationally recognized testing laboratory or shall be grounded in accordance with Section 220.70 of this Part. Where such an approved double-insulated power-operated tool is employed, it shall be distinctly marked.

B) Electric cords shall not be used for hoisting or lowering tools.

2) Pneumatic power tools.

A) Safety clips or retainers shall be securely installed on pneumatic impact tools to prevent attachments from being accidentally ejected.

B) All pneumatically driven nailers, staplers, and other similar equipment provided with automatic fastener feed which operates at more than one hundred (100) P.S.I., at the tool, shall have a safety device on the muzzle to prevent the tool from ejecting fasteners unless the muzzle is in contact with the work surface.

C) Hoses shall not be used for hoisting or lowering tools.

3) Fuel-powered tools.

 All fuel-powered tools shall be stopped while being refueled, serviced, or maintained, and fuel shall be transported, handled and stored in accordance with Section 220.110(d) of this Part, and all other applicable state and federal statutes, and rules.

4) Power-actuated tools.

A) Only employees who have been instructed in the safe operation of the particular tool being used shall be permitted to operate a power-actuated tool.

B) The tool shall be tested each day before loading to see that the safety devices are in safe working condition. The method of testing shall be in accordance with the manufacturer's recommended procedure.

C) Tools shall not be loaded until immediately prior to the intended firing time. Neither loaded nor empty tools are to be pointed at other personnel.

D) Loaded tools shall not be left unattended.

E) Fasteners shall not be driven into materials harder than manufacturers' recommendations.

F) Driving into material easily penetrated shall be avoided unless such materials are backed by a substance that will prevent the fastening device from passing completely through and creating a flying missile hazard on the other side.

G) Power-actuated tools shall not be used in hazardous locations as set forth in the National Electrical Code.

H) All tools shall be used with the appropriate shield, guard, or attachment recommended by the manufacturer.

I) Employees operating power-actuated tools shall keep all parts of their bodies behind the tool.

e) Mobile equipment; falling object protective structures (FOPS).

1) When necessary to protect the operator of the equipment, all rubber-tired crawler-mounted self-propelled scrapers, front-end loaders, dozers, graders, loaders, and tractors, with or without attachments, that are used in surface coal mines or the surface work areas of underground coal mines shall be provided with substantial falling object protective structures (FOPS). FOPS which meet the requirements of the Society of Automotive Engineers (SAE) Standard J 231 shall be considered to be a "substantial" FOPS. An authorized representative of the Department may approve a FOPS which provides protection equivalent to SAE J 231.

2) When necessary to protect the operator of the equipment, forklift or powered industrial trucks shall be provided with substantial FOPS. Such FOPS shall meet the requirements of the State of California, Division of Industrial Safety, General Safety Orders, Register 72, Number 6, February 8, 1972, Article 25, Section 3655-"Overhead Guards for High-Lift Rider Trucks."

f) Mobile equipment; rollover protective structures (ROPS).

1) All rubber-tired or crawler-mounted self-propelled scrapers, front-end loaders, dozers, graders, loaders, and tractors, with or without attachments, that are used in surface coal mines or the surface work areas of underground coal mines shall be provided with roll-over protective structures (hereinafter referred to as ROPS) in accordance with the requirements of paragraphs (f)(2) through (f)(6) of this Section, as applicable.

2) All mobile equipment described in paragraph (f)(1) of this Section shall be equipped with ROPS meeting the requirements of the Department of Labor specified in 29 CFR 1926.1001, and 1926.2002-Safety and Health Regulations for Construction.

3) Except as provided in paragraph (f)(8) of this Section, mobile equipment described in paragraph (f)(1) of this Section, manufactured prior to September 1, 1974, shall be deemed in compliance with this Section if the ROPS is installed in accordance with the recommendations of the ROPS manufacturer or designer. The coal mine operator shall exhibit certification from the ROPS manufacturer or designer in the form of a label attached to the equipment indicating the manufacturer's or fabricator's name and address, the ROPS model number, if any, the machine make, model or series number that the structure is designed to fit, and compliance with the applicable specification listed in paragraph (c)(1) or (c)(2) of this Section, or he shall, upon request of the authorized representative of the Department, furnish certification from a registered professional engineer that:

A) The ROPS complies with the Society of Automotive Engineers (SAE) Standard J 397, "Critical Zone-Characteristics and Dimensions for Operators of Construction and Industrial Machinery" or SAE J397a, "Deflection Limiting Volume for Laboratory Evaluation of Rollover Protective Structures (ROPS) and Falling Object Protective Structures (FOPS) of Construction and Industrial Vehicles" and the following applicable SAE Standards:

i) J 320a, "Minimum Performance Criteria for Rollover Protective Structure for Rubber-Tired Self-Propelled Scrapers" or J320b, "Minimum Performance Criteria for Rollover Protective Structures for Primer Movers";

ii) J 394, "Minimum Performance Criteria for Rollover Protective Structure for Rubber-Tired Front-End Loaders and Rubber-Tired Dozers" or J 394a, "Minimum Performance Criteria for Rollover Protective Structures for Wheeled Front-End Loaders and Wheeled Dozers";

iii) J 395, "Minimum Performance Criteria for Rollover Protective Structure for Crawler Tractors and Crawler-Type Loaders" or J 395a, "Minimum Performance Criteria for Rollover Protective Structures for Track-Type Tractors and Track-Type Front-End Loaders";

iv) J 396 or J 396a, "Minimum Performance Criteria for Rollover Protective Structures for Motor Graders";

v) J 167, "Protective Frame with Overhead Protection-Test Procedures and Performance Requirements"; or

vi) J 334a, "Protective Frame Test Procedures and Performance Requirements".

B) The ROPS and supporting attachments will:

i) Show satisfactory performance by actual test of a prototype involving a roll of seven hundred twenty degrees (720~) or more;

ii) Support not less than the weight of the vehicle applied as a uniformly distributed and perpendicular to a vertical plane through the longitudinal axis of the prime mover, and support two (2) times the weight of the vehicle applied as a uniformly distributed vertical load to the top of the structure; or

iii) Support the following separately applied minimum loads:

 One hundred twenty-five (125) percent of the weight of the vehicle applied as a uniformly distributed horizontal load at the top of the ROPS and perpendicular to a critical plane through the longitudinal axis of the prime mover; and a load of twice the weight of the vehicle applied as a uniformly distributed vertical load to the top of the ROPS after complying with paragraph (f)(3)(A) of this Section. Stresses shall not exceed the ultimate strength. Steel used in the ROPS must have capability to perform at zero degrees (0 ) F., or exhibit Charpy V-notch impact strength at eight (8) ft.-lb. at minus twenty degrees (-20~) F. with a standard Charpy V-notch Type A specimen and provide twenty (20) percent elongation over two (2) inches in a standard two (2) inch gauge length on a 0.505 inch diameter tensile specimen. Bolts and nuts shall be SAE grade eight (8) (reference SAE J 429d, J 429e, J 429f or J 429g, J 995, J 995a or J 995b).

4) Mobile equipment manufactured prior to September 1, 1974 meeting certain existing governmental requirements for ROPS. Mobile equipment described in paragraph (f)(1) of this Section, manufactured prior to September 1, 1974 and already equipped with ROPS, shall be deemed in compliance with this Section if it meets the ROPS requirements of the State of California, the U.S. Army Corps of Engineers, the Bureau of Reclamation of the U. S. Department of the Interior in effect on April 5, 1972, or the Occupational Safety and Health Administration, U.S. Department of Labor. The requirements in effect are:

A) State of California: Construction Safety Orders 1591(i), 1596, and Logging and Sawmill Safety Order 5243, issued by the Department of Industrial Relations pursuant to Divison 5, Labor Code Section 6312, State of California;

B) U.S. Army Corps of Engineers: Safety-General Safety Requirements, EM-385-1-1 (March 1967);

C) Bureau of Reclamation, U.S. Department of the Interior: Safety and Health Regulations for Construction, Part II (September 1971); and

D) Occupational Safety and Health Administration, U.S. Department of Labor: Safety and Health Regulations for Construction, 29 CFR 1926.1001 and 1926.1002.

5) Field welding on ROPS shall be performed by welders who are certified by the coal mine operator or equipment distributor as being qualified in accordance with the American Welding Society Structural Welding Code AWS D1.1-73, or Military Standard MIL-STD 248, or the equivalent thereof.

6) Seat belts required by Section 220.170(k)(9) shall be worn by the operator of mobile equipment required to be equipped with ROPS by this Section.

g) Machinery and equipment; operation, maintenance, and examination.

1) Mobile and stationary equipment shall be properly maintained to assure safe operating conditions. The operator of such equipment shall report any dangerous equipment defect to the mine operator. When such condition is reported, the mine operator shall take immediate action to investigate the report, and when such equipment defect is found, the equipment shall be removed from service until the defect is corrected.

2) All over-head hoists shall be secured by safety chains, ropes, or other safety devices so that in the event they become separated from the carriage track, they shall not fall.

3) The ends of all stationary and all movable carriage rails shall be equipped with safety stops at each end.

A) This includes all carriage rails that are part of the system regardless if a hoist is or is not suspended from the rail at time of inspection.

B) A means shall be provided to secure the traveling bridge to assure that the movable rail will remain in place when both a movable rail and a stationary rail are being utilized to suspend the hoist. Hoisting equipment shall be closely examined to also make certain:

i) The the hoist is securely fastened to the dolly or other support;

ii) That the dolly rides the I-beam without excessive side play;

iii) That the hoist has proper operating controls that allow the hoist to be operated from a safe position. Under no condition, shall a person or persons position themselves under a suspended load. Taglines shall be used to position or to guide loads;

iv) That the dolly or hoist does not contain bent or defective parts or defective ropes or chains;

v) That the electric hoists are being examined frequently and maintained in a safe operating condition as required by Section 220.50(c) of this Part;

vi) That the hoist is being operated within its rated capacity;

vii) That the hoists attached to H-beams are being used for vertical lifting only;

viii) That all load hooks are equipped with safety latches;

ix) That limit switches are installed for both the hoisting and lowering of electrical hoists to insure that a minimum of three (3) turns of rope remain on the drum when the rope is extended to its maximum working length; and

x) That extensions or cheaters not be used on the handle of hand-operated hoists.

h) Performing work from a raised postion; safeguards.

1) Men shall not work on or from a piece of mobile equipment in a raised position until it has been blocked in place securely. This does not preclude the use of equipment specifically designed as elevated mobile work platforms.

2) No work shall be performed under machinery or equipment that has been raised until such machinery or equipment has been securely blocked in position.

i) Drive Belts.

1) Drive belts shall not be shifted while in motion unless the machines are provided with mechanical shifters.

2) Belt dressings shall not be applied while belts are in motion except where it can be applied without endangering a person.

j) Power-driven pulleys.

1) Belts, chains, and ropes shall not be guided onto power-driven moving pulleys, sprockets, or drums with the hands except on slow moving equipment especially designed for hand feeding.

2) Pulleys of conveyors shall not be cleaned manually while the conveyor is in motion.

3) Coal or other material spilled beneath belt conveyor drives or tail pieces shall not be removed while the conveyor is in motion unless the drive or tail piece is adequately guarded, sufficient overhead clearance is provided, or special tools or equipment approved by an authorized representative of the Department are used to protect the miner performing the work.

k) Welding operations.

1) Welding operations shall be shielded and the area shall be well ventilated.

2) When air arcing and arc cutting is being performed, every precaution should be taken to minimize the effects of noise, dust, and smoke on men working in the area.

3) Components of hoists shall not be used as welding grounds.

l) Shovels, draglines, and tractors.

1) Shovels, draglines, and tractors shall not be operated in the presence of any person exposed to a hazard from its operation and all such equipment shall be provided with an adequate warning device which shall be sounded by the operator prior to starting operation.

2) Shovels and draglines shall be equipped with handrails along and around all walkways and platforms.

m) Mobile equipment; automatic warning devices.

 Mobile equipment, such as trucks, forklifts, front-end loaders, tractors and graders, shall be equipped with an adequate automatic warning device which shall give an audible alarm when such equipment is put in reverse.

n) Compressed air and boilers; general.

 All boilers and pressure vessels shall be constructed, installed, and maintained in accordance with the standards and specificiations of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code.

o) Compressed air systems.

1) Compressors and compressed-air receivers shall be equipped with automatic pressure-relief valves, pressure gauges, and drain valves.

2) Repairs involving the pressure system of compressors, receivers, or compressed-air-powered equipment shall not be attempted until the pressure has been relieved from that part of the system to be repaired.

3) At no time shall compressed air be directed toward a person. When compressed air is used, all necessary precautions shall be taken to protect persons from injury.

4) Safety chains or suitable locking devices shall be used at connections to machines of high-pressure air hose lines of one (1) inch inside diameter or larger, and between high-pressure air hose line of one (1) inch inside diameter or larger, where a connection failure would create a hazard.

p) Boilers.

1) Boilers shall be equipped with guarded, well-maintained water gauges and pressure gauges placed so that they can be observed easily. Water gauges and pipe passages to the gauges shall be kept clean and free of scale and rust.

2) Boilers shall be equipped with automatic pressure-relief valves; valves shall be opened manually at least once (1) a week to determine that they will function properly.

3) Blow-off valves shall be piped outside the building and shall have outlets so located or protected that persons passing by, near, or under them will not be scalded.

4) Boiler installations shall be provided with safety devices, meeting appropriate boiler code, to protect against hazards of flame outs, fuel interruptions, and low water level.

5) Boilers shall be inspected internally at least once (1) a year by a licensed boiler inspector and a certificate of inspection signed by the inspector shall be displayed in the vicinity of the boiler.