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SAFETY CODE SERIES

SAFETY CODE
FOR
WOODWORKING PLANTS

INTERNATIONAL ASSOCIATION OF INDUSTRIAL ACCIDENT BOARDS AND
COMMISSIONS AND THE NATIONAL BUREAU OF CASUALTY
AND SURETY UNDERWRITERS, SPONSORS

—
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CODE FOR WOODWORKING PLANTS

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SAFETY CODE FOR WOODWORKING PLANTS

INTRODUCTION

1. This woodworking safety code is primarily intended to cover the hazards of the "point of operation" in woodworking machinery from the crude lumber to the finished product.

2. This code is one of a series intended ultimately to cover all American industry which are being prepared under the procedure of the American Engineering Standards Committee.

3. The code is in form to be adopted by States and municipalities or promulgated by order of an industrial commission.

4. It may also be used by industrial establishments which use woodworking machinery to test and standardize their safety equipment.

5. The code will be revised from time to time to keep it abreast with the advances of safety practice.

SECTION 1. SCOPE, APPLICATION, AND EXCEPTION

Rule 10. Scope.

This code is intended as a guide for the safe operation and maintenance of woodworking machinery, including cooperage and making of veneer. It deals primarily with "point of operation" hazards on woodworking machinery.

Rule 11. Application and exceptions.

The purpose of this code is to provide reasonable safety for life, limb, and health. In cases of practical difficulty or unnecessary hardship the enforcing authority may grant exceptions from the literal requirements of this code or permit the use of other devices or methods, but only when it is clearly evident that equivalent protection is thereby afforded.

NOTE.—It is suggested that when exceptions are asked the enforcing authority consult with the Committee on Safety Code for Woodworking Plants, care American Engineering Standards Committee, 29 West Thirty-ninth Street, New York City. Such consultation will tend to bring about uniform application of the code and will keep the committee informed of criticisms which should be considered.

Rule 12. New and old installations.

After the date when this code becomes effective all new construction and installations shall conform to its provisions. Equipment installed prior to that date shall be modified to conform to its provisions unless exception is allowed in accordance with rule 11.

Rule 13. Reference to other codes.

The present code is supplemented by the following codes of the American Engineering Standards Committee which deal with general hazards. Of special importance are the following:

- (a) Mechanical power-transmission apparatus.
- (b) Exhaust systems.
- (c) Lighting.
- (d) Electrical codes:
 1. National Fire Code.
 2. National Safety Code.
 3. Power Control Code.

SECTION 2. DEFINITIONS**Rule 20. "Shall" and "should."**

The word "shall" is to be understood as mandatory; the word "should" as advisory.

Rule 21. Point of operations.

The term "point of operations" shall be understood to mean that point at which cutting, shaping, or forming is accomplished upon the stock, and shall include such other points as may offer a hazard to the operator in inserting or manipulating the stock in the operation of the machine.

Rule 22. Push stick.

Push stick shall mean a narrow strip of wood with a notch cut into one end and used to push short pieces of lumber through saws.

Rule 23. Push block.

Push block shall mean a short block of hardwood provided with a handle similar to that of a plane and having a shoulder at the rear end. This block is used for pushing short stock over revolving cutters.

PART I.—PLANT LAYOUT**SECTION 10. MACHINERY****Rule 100. Machine layout.**

(a) Machines should be so located that each operator will have sufficient space in which to handle the material with the least possible interference from or to other workmen or machines. Machines should be so placed that it will not be necessary for the operator to stand in or so near an aisle as to be liable to hazard.

(b) Woodworking machinery shall be firmly secured to substantial floor or foundations.

NOTE.—Wherever plant layout permits, it is advisable to locate heavy-duty machines on the ground floor.

(c) Machines should be arranged to take advantage of natural lighting as far as possible.

(d) Provision should be made for the removal of shavings and dust.

SECTION 11. FLOORS AND AISLES**Rule 110. Floors kept repaired.**

All floors shall be kept in good repair and shall be free from protruding nails, splinters, holes, unevenness, and loose boards.

Rule 111. Nonslip floors.

Floors where operators stand to operate machines, such as wood shapers, jointers, saws, and wood-turning lathes, shall be provided with effective means to prevent slipping.

Rule 112. Aisles.

Aisles of sufficient width to permit the passing of trucks and workmen without crowding shall be maintained in all working places and stock rooms.

PART II.—MACHINES AND EQUIPMENT**SECTION 20. MACHINE DRIVE, FEED, SPEED, AND CONTROL****Rule 200. Machine drive.**

(a) It is recommended that careful consideration be given to the advantages of individual motor drive.

(b) Not more than 10 machines should be driven by a single motor or other power unit.

(c) A mechanical or electrical power control should be provided on each machine which will make it possible for the operator to cut off the power from each machine without leaving his position at the point of operation.

(d) For general rules regarding starting and stopping devices, emergency stops, etc., see Safety Code for Mechanical Power-Transmission Apparatus.

Rule 201. Self-feed.

It is recommended that automatic feeding devices on machines be installed wherever the nature of the work will permit.

Rule 202. Speeds.

(a) *Circular saws.*—The table gives the recommended and maximum speed in revolutions per minute for various sizes of circular saws working in softwood. The maximum allowable speed, given in the third column of the table, shall not be exceeded.

CIRCULAR SAW SPEEDS

Diameter of saw	Revolutions per minute	
	Recommended for softwoods	Maximum speed
8-inch.....	4,500	5,400
10-inch.....	3,600	4,320
12-inch.....	3,000	3,600
14-inch.....	2,570	3,085
16-inch.....	2,250	2,700
18-inch.....	2,000	2,400
20-inch.....	1,800	2,160
22-inch.....	1,635	1,965
24-inch.....	1,500	1,800
26-inch.....	1,385	1,660
28-inch.....	1,285	1,540
30-inch.....	1,200	1,440
32-inch.....	1,125	1,350
34-inch.....	1,060	1,270
36-inch.....	1,000	1,200
40-inch.....	900	1,080
44-inch.....	820	980
48-inch.....	750	900
54-inch.....	665	800
60-inch.....	600	720

(b) Band saws.

1. No band-saw wheel shall be run at a speed in excess of that which will allow a factor of safety of 10 in all parts of the wheel.

2. The frame of each machine shall be marked by the manufacturer in letters not less than one-quarter of an inch in height showing this maximum allowable speed.

3. Band-saw wheels shall be so designed, manufactured, and mounted that they will run true at the maximum allowable speed without excessive vibration.

PART III.—WOODWORKING MACHINERY**SECTION 30. CIRCULAR CROSSCUT, RIP, RESAW, AND SWING CUT-OFF SAWS**

NOTE TO SECTION 30.—It is recognized that these standards for saw guards are not perfectly applicable to all operations for which saws are used.

The standards given are those upon which woodworkers have agreed as most generally useful.

Since there are a considerable number of cases not satisfactorily met by these standards, the enforcing authority should exercise rather wide latitude in allowing the use of other devices which give promise of affording adequate protection.

It may be expected that by so doing further progress in saw guarding will be encouraged.

Rule 300. Crosscut table saws.

Each circular crosscut saw shall be guarded by a hood which shall cover the saw at all times at least to the depth of the teeth. The hood shall adjust itself automatically to the thickness of, and shall remain in contact with, the material being cut. The hood shall also be so designed as to protect the operator from flying splinters and broken saw teeth.

Rule 301. Ripsaws.

(a) Each circular ripsaw shall be guarded by a hood which shall cover the saw at all times at least to the depth of the teeth. The hood shall adjust itself automatically to the thickness of, and shall remain in contact with, the material being cut. The hood shall also be so designed as to protect the operator from flying splinters and broken saw teeth.

The hood for self-feed ripsaw need not rest upon the table nor upon the material being cut. Such hoods shall be required to extend to a position not more than one-half inch above a plane passing through the bottom of the feed rolls.

(b) Spreader.—Each circular ripsaw (other than self-feed saws with a roller or wheel back of saw) shall be provided with a spreader fastened securely behind the saw. The spreader shall be slightly thinner than the saw kerf and slightly thicker than the saw disk.

(c) Kick-back device.—Each circular ripsaw (other than self-feed saws with a roller or wheel back of saw) shall be provided with a device to prevent material from being thrown back on the operator.

Rule 302. Circular resaws.

(a) Each circular resaw shall be guarded by a hood or shield of metal above the saw. Such hood or shield shall be so designed as to guard against danger from flying splinters or broken saw teeth.

(b) Each circular resaw (other than self-feed saws with a roller or wheel at back of saw) shall be provided with a spreader fastened securely behind the saw. The spreader shall be slightly thinner than the saw kerf and slightly thicker than the saw disk.

Rule 303. Feed rolls.

Feed rolls shall be protected by a semicylindrical guard to prevent the hands of the operator from coming in contact with the in-running rolls at any point. The guard shall be constructed of heavy material, preferably metal, adjustable to the size of the stock being cut and firmly secured to the frame of the machine.

Rule 304. Swing cut-off saws.

Each swing cut-off saw shall be provided with a metal hood, so arranged that the part of the saw above the table is covered to at least the root of the teeth. This hood shall be constructed in such a manner and of such material that it will afford the operator a view of the cutting edge of the saw at all times.

NOTE.—The hood should adjust itself automatically to the thickness of, and remain in contact with, the material being cut. The hood shall be so designed as to protect the operator from flying splinters and broken saw teeth.

Rule 305. Counterweights.

Each swing cut-off saw shall be provided with an effective device to return the saw automatically to the back of the table when released at any point of its travel. Such device shall not depend for its proper functioning upon any rope, cord, or spring. If there is a counterweight, one of the following or equivalent means shall be used to prevent its dropping:

(a) It shall be bolted to the bar by means of a bolt passing through both bar and counterweight.

(b) A bolt shall be put through the extreme end of the bar.

(c) Where the counterweight does not encircle the bar a safety chain shall be attached to it.

Rule 306. Limit stops and latches.

(a) Limit chains or other equally effective devices shall be provided to prevent the saw from swinging too far in either direction.

(b) A latch may be provided to catch and retain the saw at the rear of the table.

Rule 307. Guarding of saws beneath and behind tables.

Where conditions are such that there is possibility of contact with the saw plate, the exhaust hood, or guard if no exhaust system is required, shall be so arranged and maintained as to guard effectively that portion of the saw which is beneath and behind the saw table.

SECTION 31. BAND SAWS AND BAND RESAWS

Rule 310. Inclosing saw blades.

All portions of the saw blade shall be inclosed or guarded except the working side of the blade below the guide rolls or gauge. Such guard shall be self-adjusting. Band-saw wheels shall be fully incased.

Rule 311. Feed rolls.

Feed rolls shall be protected with a semicylindrical guard to prevent the hands of the operator from coming in contact with the in-running rolls at any point. The guard shall be constructed of heavy material, preferably metal, adjustable to the size of stock being cut, and firmly secured to the frame of the machine.

SECTION 32. JOINTERS**Rule 320. Automatic guards.**

To afford maximum protection, each hand-feed planer and jointer with horizontal head should have an automatic guard over the cutting head.

Rule 321. Point of operation.

(a) Each hand-feed planer and jointer with horizontal head shall be equipped with a cylindrical cutting head, the throat of which shall not exceed seven-sixteenths ($\frac{7}{16}$) inch in depth nor five-eighths ($\frac{5}{8}$) inch in width. It is strongly recommended that no cylinder be used in which the throat exceeds three-eighths ($\frac{3}{8}$) inch in depth or one-half ($\frac{1}{2}$) inch in width.

(b) Each wood jointer with vertical head shall have either an exhaust hood or other guard so arranged as to inclose completely the revolving head, except a slot of such width as may be necessary and convenient for the application of the material to be jointed.

SECTION 33. TENONING MACHINES**Rule 330. Guarding of cutting heads.**

(a) Each tenoning machine shall have all cutting heads, and saws if used, covered by a metal guard. If such guard is constructed of sheet metal, the material used shall be not less than one-eighth ($\frac{1}{8}$) inch (approximately No. 11 gauge) in thickness, while if cast iron is used it shall be not less than three-sixteenths ($\frac{3}{16}$) inch in thickness.

(b) Where an exhaust system is used, the hood may form part or all of the guard and shall be constructed of metal of a thickness not less than the above.

Rule 331. Feed chains and sprockets.

(a) Feed chains and sprockets of all double end tenoning machines shall be completely inclosed, except that portion of chain used for conveying the stock.

(b) At rear ends of frames over which the feed conveyors run, sprockets and chains shall be guarded at sides by plates projecting beyond periphery of sprockets and ends of lugs.

(c) Where space permits, the rear end of the frame over which the feed conveyors run should be so extended that the material as it leaves the machine will be guided to a point within easy reach of the person "taking away" at the rear of the tenoner.

SECTION 34. BORING AND MORTISING MACHINES**Rule 340. Chucks.**

Safety bit chucks with no projecting set screws shall be used.

Rule 341. Counterweights.

If there is a counterweight, one of the following or equivalent means shall be used to prevent its dropping:

(a) It shall be bolted to the bar by means of a bolt passing through both bar and counterweight.

(b) A bolt shall be put through the extreme end of the bar.

(c) Where the counterweight does not encircle the bar a safety chain shall be attached to it.

NOTE.—Counterweights suspended by chain or rope should travel in a pipe or other suitable inclosure wherever they might fall and cause injury.

Rule 342. Universal joints.

Universal joints on spindles or boring machines shall be inclosed to prevent injury to operator.

Rule 343. Guarding operating treadles.

An iron stirrup shall be fastened to the floor over the treadle, leaving only sufficient room for the operator's foot between treadle and stirrup.

SECTION 35. WOOD SHAPERS, ETC.**Rule 350. Guarding of cutting heads.**

The cutting head of each wood shaper, hand-feed panel raiser, or other similar machine not automatically fed, shall be inclosed with a cage or adjustable guard so designed as to keep the operator's hands away from the cutting edge. In no case shall a warning device of leather or other material attached to the spindle be acceptable. Cylindrical heads should be used wherever the nature of the work will permit. Diameter of circular shaper guards shall be not less than the greatest diameter of the cutter.

Rule 351. Spindle starting and stopping devices.

All double spindle shapers shall be provided with a spindle starting and stopping device for each spindle.

SECTION 36. PLANING, MOLDING, STICKING, AND MATCHING MACHINES, ETC.**Rule 360. Guarding of cutting heads.**

(a) Each planing, molding, sticking, and matching machine shall have all cutting heads, and saws if used, covered by a metal guard. If such guard is constructed of sheet metal, the material used shall be not less than one-eighth ($\frac{1}{8}$) inch (approximately No. 11 gauge) in thickness, while if cast iron is used it shall be not less than three-sixteenths ($\frac{3}{16}$) inch in thickness.

(b) Where an exhaust system is used the hood may form part or all of the guard and shall be constructed of metal of a thickness not less than the above.

Rule 361. Feed rolls.

(a) Feed rolls shall be guarded by a strip or bar fastened to the frame carrying the rolls so as to remain in adjustment for any thickness of stock. Where the top roll is corrugated the guard shall be extended over the top of the roll.

(b) Sectional feed rolls should be provided for planers, matchers, and molders.

(c) Where solid feed rolls are used the sectional finger device should be used to prevent kick backs.

SECTION 37. PROFILE, SWING-HEAD, AND BACK-KNIFE LATHES

Rule 370. Guarding of cutting heads.

(a) Each profile, swing-head, and back-knife lathe shall have all cutting heads, if used covered by a metal guard. If such guard is constructed of sheet metal, the material used shall be not less than one-eighth ($\frac{1}{8}$) inch (approximately No. 11 gauge) in thickness, while if cast iron is used it shall be not less than three-sixteenths ($\frac{3}{16}$) inch in thickness.

(b) Where an exhaust system is used the hood may form part or all of the guard and shall be constructed of metal of a thickness not less than the above.

SECTION 38. SANDING MACHINES

Rule 380. Feed rolls.

Feed rolls of drum-feed sanding machines shall be protected with a semi-cylindrical guard to prevent the hands of the operator from coming in contact with the in-running rolls at any point. The guard shall be constructed of heavy material, preferably metal, adjustable to the size of stock being finished, and firmly secured to the frame of the machine.

Rule 381. Drum sanding machines.

Each drum sanding machine shall have an exhaust hood or other guard, if no exhaust system is required, so arranged as to inclose the revolving drum, except such portion of the drum above the table, if table is used, as may be necessary and convenient for the application of the material to be finished.

Rule 382. Disk sanding machines.

Each disk sanding machine shall have the exhaust hood or other guard, if no exhaust system is required, so arranged as to inclose the revolving disk, except such portion of the disk above the table, if table is used, as may be necessary for the application of the material to be finished.

Rule 383. Belt sanding machines.

Each belt sanding machine shall have both pulleys inclosed in such a manner as to guard the points where the belt runs on to the pulleys. The edges of the unused run of belt shall be inclosed.

NOTE.—For guarding of pulleys see Safety Code for Mechanical Power-Transmission Apparatus.

SECTION 39. MISCELLANEOUS MACHINES

Rule 390. Other machines not excluded.

The mention of specific machines under sections 30 to 38, inclusive, is not intended to exclude other working machines from the requirements that suitable guards and exhaust hoods must be provided to reduce to a minimum the hazard due to the point of operation of such machines.

PART IV.—VENEER MACHINERY**SECTION 40. STEAMING EQUIPMENT AND SOAKING PITS****Rule 400. Steam vats and soaking pits.**

(a) Sides of steam vats shall extend to a height of not less than thirty-six (36) inches above the floor, working platform, or ground.

(b) Large steam vats divided into sections shall be provided with substantial walkways between sections, each walkway to be provided with a standard handrail, removable if necessary.

NOTE.—Provided the size of stock handled will permit, it is advisable to keep the size of the vat sections in eight (8) feet or less.

(c) Finger guards shall be provided for steaming vats.

(d) In so far as possible vats shall be located in buildings or in special sheds heated in cold weather to keep the amount of steam at a minimum.

(e) Means shall be provided to ventilate buildings in which steam vats are located.

NOTE.—High ceilings with roof ventilators or louvers are desirable. Where ceilings or roofs are low, exhaust fans should be provided.

SECTION 41. LOG-HANDLING EQUIPMENT**Rule 410. Cranes, log trolleys, etc.**

(a) All gears, sprockets, and other dangerous parts shall be inclosed with standard guards. (See Safety Code for Mechanical Power-Transmission Apparatus.)

NOTE.—The use of log trolleys or cranes is urgently recommended except where the stock handled is very small.

SECTION 42. SAWS**Rule 420. Drag-saws.**

(a) Drag-saws shall be so located as to give at least four (4) feet clearance for passage when saw is at extreme end of stroke, or if such clearance is not obtainable the saw and its driving mechanism shall be provided with a standard inclosure.

SECTION 43. VENEER CUTTERS AND WRINGERS**Rule 430. Veneer slicer and rotary veneer cutters.**

Revolving and other moving knives shall be guarded.

Rule 431. Veneer clippers.

(a) Veneer clippers shall have automatic feed or shall be provided with a guard which will make it impossible to place a finger or fingers under the knife while feeding stock.

(b) Sprockets on chain or slat belt conveyors shall be inclosed.

NOTE.—It is recommended that conveyors or traveling tables be installed to remove material from clippers.

Rule 432. Veneer wringers.

In-running side of veneer wringer shall be inclosed, leaving only sufficient space to insert stock but not enough to permit fingers to enter the rolls.

Rule 433. Operating levers or treadles.

Operating levers or treadles on all veneer machinery shall be so located or protected that they can not be shifted or tripped accidentally.

PART V.—COOPERAGE MACHINERY**SECTION 50. SAWS****Rule 500. Heading bolters.**

(a) Each heading bolter shall have the saw inclosed to prevent accidental contact.

NOTE.—A hood fastened to the back of log carrier is recommended to cover that portion of the saw which can not be inclosed by a stationary housing.

(b) The log carrier shall be provided with an effective device that will return the carrier automatically to a position in front of the saw. Such device shall not depend for its proper functioning upon any rope, cord, or spring. If a counterweight is used, a safety chain should be attached to it to prevent dropping should the bar break or the weight become disengaged. All bolts supporting the bar, weight, and chain shall be provided with cotter pins or equally effective device. A bolt shall be put through extreme end of counterweight bar to prevent dropping of weight.

(c) A limit stop shall be provided to prevent the carrier from swinging too far back and thereby exposing to contact the unguarded position of the saw.

Rule 501. Swing cut-off saws.

For rules covering this equipment see section 30, rules 304 to 307, inclusive.

Rule 502. Bolt, stave, and heading equalizers.

Each bolt, stave, and heading equalizer shall have the saws inclosed to prevent accidental contact, except that portion immediately adjacent to the feeding device.

Rule 503. Barrel-stave saws (cylindrical saws).

Each machine of this type shall have the saw and the revolving part to which the saw blade is bolted inclosed to prevent accidental contact, except that part of saw immediately adjacent to the feeding device.

Rule 504. Heading saws, variable-feed ripaws, flat-stave saws, head rounders, etc.

(a) All machines coming under this rule shall have the saws inclosed to prevent accidental contact.

(b) Where sprocket feed device is used it shall be inclosed in such a manner as to prevent the operator's fingers from getting between the feed sprocket and the stock.

(c) Counterweights used to actuate feed shall operate in a stationary casing.

SECTION 51. SINGLE AND DOUBLE STAVE PLANERS, SINGLE AND DOUBLE HEADING PLANERS**Rule 510. Guarding of cutting heads.**

The exhaust hood or other guards, if no exhaust system is required, shall be so arranged and maintained as to guard effectively all cutting heads and knives of single and double planers.

Rule 511. Point of operation.

(a) Feed rolls, except such portion as may be necessary to admit stock, shall be completely inclosed.

NOTE.—Sectional feed rolls should be provided for heading planers.

(b) Where solid feed rolls are in use a sectional finger device (or an equally effective safeguard) shall be used to prevent kick backs.

SECTION 52. STAVE AND HEADING JOINTERS AND MATCHERS**Rule 520. Guarding.**

Each stave or heading jointer shall have an adjustable or automatic guard to cover all of the head except that portion where the stock is applied.

Rule 521. Foot-power machines.

Foot-power machines for jointing staves shall be equipped with a guard which prevents the operator's fingers from coming in contact with the knife.

SECTION 53. STAVE CROZIERS**Rule 530. Guarding.**

The cutting heads shall be incased except that part which actually embeds itself in the stock.

Rule 531. Feed chains.

The feed chains and sprockets of stave croziers shall be completely inclosed.

Rule 532. Counterweights.

A safety chain should be attached to counterweight to prevent dropping should the counterweight bar break or the weight become disengaged. All bolts supporting the bar, weight, and chain shall be provided with cotter pins or other equally effective method of locking. A bolt shall be put through extreme end of counterweight rod to prevent dropping of weight.

SECTION 54. BARREL SANDING MACHINES**Rule 540. Sanding belts.**

Each belt sanding machine shall have both pulleys inclosed in such a manner as to guard the points where the belt runs onto the pulley. The edges of the unused run of the belts shall be inclosed.

SECTION 55. POWER WINDLASS FOR BARRELS**Rule 550. Counterweights.**

Counterweights shall operate in a stationary casing.

Rule 551. Control levers.

Control levers shall be located within easy reach of the operator when standing in the usual operating position.

SECTION 56. PAIL AND BARREL LATHES**Rule 560. Guards.**

The requirements of section 37 for back-knife and profile lathes, in so far as they are applicable, shall govern the guarding of pail and barrel lathes.

SECTION 57. MISCELLANEOUS COOPERAGE MACHINERY**Rule 570. Other machines not excluded.**

The mention of specific machines under sections 50 to 55, inclusive, is not intended to exclude other working machines from the requirements that safeguards be provided to reduce to a minimum the hazard due to the point of operation of such machines.

PART VI.—OPERATING RULES**SECTION 60.—INSPECTION AND MAINTENANCE****Rule 600. Inspection.**

All woodworking machinery should be inspected at intervals not exceeding 60 days.

Rule 601. Maintenance.

(a) Dull, badly set, improperly filed, and gummed saws are responsible for a large proportion of circular and band saw accidents. Great care should be taken by those responsible for the condition of such saws to make sure that they are properly filed, set, etc.; also that they are removed as soon as they show indication of becoming dull.

(b) All knives and cutting heads of woodworking machines should be kept sharp, properly adjusted, and firmly secured.

(c) Bearings should be kept free from lost motion and well lubricated.

(d) Arbors of all circular saws should be free from play.

(e) Guards should be installed wherever possible and their use enforced. If special operations require the removal of the guard, it should be immediately replaced upon the completion of the work which required its removal. No employee should be permitted to remove a guard or to operate the machine without the guard except with the consent of the foreman.

SECTION 61. SELECTION AND OPERATION OF MACHINES**Rule 610. Selection of suitable machines.**

Machines should not be used for operations of such variety as to necessitate the removal of safeguards suitable for the usual service. The specific operations involving special hazards should be assigned to machines suitable for such work.

Rule 611. Circular rip and cut-off saws.

(a) No foreman or other person in charge should permit a circular ripsaw to be operated with hood, spreader, or kick-back device removed, or rendered inoperative, unless the nature of the operation renders it impossible of performance with such devices, or any of them, in position, in which case same shall be immediately replaced upon completion of such operation.

(b) All cracked saws should be removed from service.

Rule 612. Band saws and band resaws.

(a) Before starting a band saw the blade should be tested with fingers and proper tension secured.

(b) The back thrust should be adjusted carefully to the normal position of the saw blade.

(c) To secure satisfactory operation, means should be provided for preventing the accumulation of dust on the face of band wheels.

(d) Using a small saw for large work or forcing a wide saw to cut on a small radius is bad practice. The saw blade should in all cases be as large as the nature of the work will permit.

(e) Saws should not be stopped too quickly nor by thrusting a piece of wood against the cutting edge of teeth when power is off.

(f) Twists or kinks should be promptly removed with a hammer.

(g) To avoid vibration, brazed joints should not be thicker than the saw blade.

(h) Each saw should be carefully examined as it is put on or taken off the band wheel to detect cracks or other defects. Cracked saws or saws which indicate probability of breakage should be promptly removed to avoid injury both to saw and to operator.

Rule 613. Lathes.

Particular care should be taken to have all material fastened securely to faceplates or held properly between centers.

SECTION 62. VENEER MACHINES AND EQUIPMENT**Rule 620. Steam vats.**

(a) Covers should be removed only from that portion of steaming vats on which men are working. A portable railing should be placed at this point to protect the operators.

(b) Workmen should be forbidden to ride or step on logs in steam vats.

(c) All cranes, log trolleys, and other hoisting equipment used in the veneer industry should be tested and inspected frequently.

(d) When attaching dogs to log care should be taken not to place hand or fingers where they might be caught between log and dog.

(e) Particular attention should be given to inspection and maintenance of veneer saws.

(f) Care should be taken to see that all material is securely fastened to the saw table.

(g) Whenever veneer slicers or rotary veneer cutters have been shut down for the purpose of inserting log or to make adjustments operators should make sure that machine is clear and other workmen are not in a hazardous position before starting the machine.

(h) Operators should be forbidden to ride the carriage of a veneer slicer.

SECTION 63. CLOTHING AND GOGGLES WORN BY OPERATORS**Rule 630. Clothing.**

(a) Gloves should not be worn while operating machines.

(b) Loose flowing garments, sleeves, neckties, etc., offer a decided accident hazard and should not be worn by operators of machines.

Rule 631. Goggles.

Where danger from dust, flying chips, etc., exist, proper eye protection should be provided. (See National Safety Code for the Protection of the Heads and Eyes of Industrial Workers.)

PART VII.—EXPLANATORY MATTER**SECTION 70****Rule 700. Location of machinery.**

By locating heavy-duty machinery on the ground floor, most of the vibration due to high operating speed can be eliminated.

Rule 701. Machine foundations.

Undue vibration and noise caused by high-speed machinery may be eliminated to a large extent by cushioning the machine foundation. This can be done by inserting rubber, felt, cork, or other elastic material between the machine base and the floor beams or girders to which the machine is fastened. It must be borne in mind, however, that the bolts that hold the machine to the foundation must not pass through or touch the girders or floor beams of building. The cushioning material must be fastened to the floor beams or girders by bolts that are independent of the machine base.

Rule 702. Motor drive.

The initial expense of individual motor drive is frequently higher than that of other power-transmission equipment such as line shafting, etc., but has a great many advantages. It offers a better control of the individual machine. It also eliminates overhead shafting and belting, thereby improving lighting and general appearance of shop. Then, too, it eliminates injuries due to oiling and maintenance of overhead transmission equipment.

Rule 703. Lighting.

Proper lighting is of vital importance. It is a widespread belief among men experienced in accident prevention work that 25 per cent of all avoidable accidents in the country are due to improper lighting. Too much is often as bad as insufficient illumination. The Lighting Code gives values of intensities. It is also important that proper attention is given to the maintenance of all lighting equipment, i. e., cleaning and adjustment of reflectors. Dust accumulated on the lamp bulbs quickly cuts down the intensity of the light. Makeshift reflectors or those whose adjustment has been impaired have a tendency to spoil the efficiency of any carefully worked out lighting system.

Rule 704. Selection of suitable machines.

Under rule 610 of this code the statement is made that machines should not be used for operations of such variety as to necessitate the

removal of safeguards suitable for the usual service. It is well to plan or route the work in such a way as to avoid too frequent adjustment of machines and altering of position of guards. The proper regard for this rule will increase production by reducing the time lost due to making adjustments, and will also reduce accidents by insuring continued use of safeguards suitable to the work.

Rule 705. Saw speeds.

The speeds for circular saws shown in Part II, under section 20, rule 202, were obtained by dividing 36,000 by the diameter of the saw expressed in inches. The figure obtained in this manner gives the recommended speed for softwoods. The maximum speed is 20 per cent higher than the recommended speed. Speeds of saws not given in this table may be obtained in this manner.

If the maximum speed only is required, it can be obtained by dividing 43,200 by the diameter of the saw.

The recommended speeds are based on a peripheral velocity of 9,325 feet per minute, which is approximately correct for softwoods, but may be reduced as much as 20 to 25 per cent for hardwoods.

The most effective speed for any particular saw also depends, to some extent, upon the weight of the frame and the size of the bearings upon which it is mounted. Construction of inadequate weight and rigidity may necessitate operation at speed lower than that recommended in the table of rule 202 for satisfactory operation.

Rule 706. Care of machines and tools.

Dull and improperly set tools are the direct cause of many accidents which are attributed to carelessness of operator or lack of proper guards.

Rule 707. Cracked saws.

The practice of drilling the end of a crack in a saw to prevent further cracking should not be permitted, as the use of such a saw is extremely dangerous. Cracked saws should not be used.

Rule 708. Wobble saws.

In some plants it is customary to rig up a circular saw by inserting wedges between the saw disk and the collar to form what is commonly known as a wobble saw. This saw is used for the work ordinarily performed by a dado saw. This practice is dangerous and should not be permitted.

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