



STATE OF NEW JERSEY
DEPARTMENT OF LABOR & INDUSTRY
J. L. BROWN, ACTING COMMISSIONER

RULES AND REGULATIONS

governing

MACHINERY USING ROLLS OF ANY TYPE

Bureau of Engineering and Safety
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FOREWORD

The ultimate protection of all roll mill, calendar and similar type machinery cannot be accomplished by rules and regulations alone but required standards of equipment and of usage will certainly minimize the hazard. In addition, enforcement problems should become less troublesome, and alert and cooperating operators will serve to improve accident statistics.

The special committee appointed by Commissioner Percy A. Miller, Jr., has given this phase of industrial safety a much needed technical and editorial revision.

These rules are promulgated by the Commissioner by statutory authority. Opportunity for public review and criticism is afforded and subsequent additions and improvements are proposed. In accordance with standard procedure these rules were subject to review by and the recommendations of the New Jersey Industrial Safety Committee.

Acknowledgement is made to the excellent and diligent work of the special committee as well as to those who have contributed time and effort to this cause and objective. The National Association of Mutual Casualty Companies publication for point of operation guards, manufacturers data, American Standards Association publications and existing codes and literature on the subject have been utilized to maximum advantage.

After considerable study the committee decided to arrange these rules and regulations into one general section which embraces all machinery included in the scope and supplemental sections to apply to specific types of equipment. Section II includes requirements not fully covered in Section I for the type of equipment used in the plastic and rubber industries. It is intended to prepare additional sections where appropriate, after study of machinery used in the paint, soap, chocolate, textile coatings, and paper industries. Requirements for equipment used in laboratory operations will be studied also for a specific section. The

special committee will continue to function until the additional sections have been completed.

These rules supercede and replace the former Safety Code for Mills and Calendars published by the Bureau in 1939.

EXTRACTS OF LABOR LAWS

R.S. 34:1-20 Rules & Regulations

The Commissioner may make and publish rules and regulations not inconsistent with law as he shall deem necessary to enforce the provisions of this title.

Whenever any condition is found to exist in contravention of any provision of this title, the Commissioner may by written order signed by him specifying the things to be done and the time for compliance, require such conditions to be corrected.

R.S. 34:6-62 Machine guards

The owner or person in charge of any factory, workshop, mill or place where the manufacture of goods is carried on where machinery is used, shall provide, in the discretion of the commissioner, friction clutches for stopping shafting, and belt shifters or other mechanical contrivances for the purpose of throwing on or off belts or pulleys. Whenever practicable, all machinery shall be provided with loose pulleys. All vats, pans, saws, planers, power presses, foot presses, cogs, gearing, belting, shafting, set screws, drums and machinery of every description shall be properly guarded. No person shall remove or make ineffective any safeguard around or attached to such machinery, vats or pans while the same are in use, unless for the purpose of immediately making repairs thereto, and all such safeguards so removed shall be promptly replaced. If the machinery, or any part thereof, or any vat, pan or vessel containing molten metal or hot liquid is in a dangerous condition or is not properly guarded, the use thereof may be prohibited by the commissioner, and a notice to that effect shall be attached thereto. Such notice shall not be removed until the machinery is made safe and the required safeguards are provided. In the meantime such unsafe or dangerous machinery, vats, pans, or vessels containing molten metal or liquid shall not be used. When, in the opinion of the commissioner, it is necessary, the halls or other portions of a building shall be provided with proper lighting facilities.

Any corporation, firm or person violating any of the provisions of this section shall, for each offense, be liable to a penalty of fifty dollars.

R.S. 34:1-37 Safety and Sanitation in Industry

The deputy director in charge of the Bureau of Hygiene, Sanitation and Mine Inspection shall perform, under the supervision and control of the Commissioner, the duties devolving upon the department or the Commissioner with relation to the elimination of dust, fumes and excessive heat in industrial operations, the investigation of occupational diseases, the ventilation and sanitation of factories, mills, bakeries, workshops and places where goods are manufactured, the inspection of mines, quarries, tunnels and caissons, the direction of industrial safety education, and, such additional correlated duties as the commissioner shall direct.

R.S. 34:6-141 Owner to register before commencing business

Every person engaging in any productive industry within the supervision of the department, as a factory, workshop, mill, newspaper plant, printery or commercial laundry shall register the same with the Commissioner before the commencement of business, giving the legal name, home address, the nature of the business, the maximum number of persons to be employed, and such other data as the Commissioner may require.

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SECTION I - GENERAL REQUIREMENTS

- 1.1 Scope These rules and regulations govern the safe installation, operation and maintenance, in all places of employment, of all machines with rolls where a nip or pinch zone exists, as well as conditions in the adjacent working areas.
- 1.2 Purpose The purpose of these rules and regulations is to provide reasonable safety to life and limb of workers in industries using machines with rolls where a nip or pinch zone exists.
- 1.3 Compliance Compliance with the minimum requirements of these rules and regulations shall be necessary in all places of employment.
- 1.3.1 New Installations After the date on which these rules become effective, all new installations shall be in compliance with these regulations.
- 1.3.2 Existing Installations When existing installations are not in compliance with these Rules and Regulations, efforts shall be made to correct the deficiencies within two years of the effective date. Upon request in writing, the Department will consider an extension of time.
- 1.4 Exceptions In the case of practical difficulty or unnecessary hardship, the Commissioner may grant exceptions from these rules and regulations, provided that a request for such exception has been made in writing to the Deputy Director of the Division. Exceptions can only be granted where it is clearly evident that satisfactory safety is otherwise achieved.
- 1.5 General Definitions
- 1.5.1 Approved approved by the Commissioner.
- 1.5.2 Bureau Bureau of Engineering & Safety of the Department.
- 1.5.3 Commissioner - Commissioner of Labor & Industry of the State of New Jersey or any of his authorized representatives.
- 1.5.4 Department - New Jersey Department of Labor & Industry.

- 1.5.5 Effective date - the date indicated elsewhere herein on which these rules and regulations become effective.
- 1.5.6 Existing - installed or operated before the effective date and including work that has been contracted for prior to the effective date.
- 1.5.7 New installation - installed or relocated after the effective date.
- 1.5.8 Place of employment - every factory, workshop, mill or other place where goods are manufactured or processed.
- 1.5.9 Shall - where used, the requirement is mandatory.
- 1.5.10 Should - where used, is indicative of a practice recommended by the Department.
- 1.5.11 Singular, plural - statements made in the singular shall also include the plural, and the plural the singular.

1.6 Special Definitions

- 1.6.1 Inrunning Rolls - shall mean a set of two or more adjacent rolls which revolve in opposite directions and that have a nip or pinch zone.
- 1.6.2 Horizontal Inrunning Rolls - Rolls with horizontal axes at approximately the same height.
- 1.6.3 Vertical Inrunning Rolls - Rolls with horizontal axes one above the other.
- 1.6.4 Nip or Pinch Zone - Shall be that zone in which there is danger of any part of the operator's body being drawn into the rolls or between the stock and roll, or between a roll and an adjacent object.
- 1.6.5 Emergency Stopping Device - a device to bring the machine to a quick stop in order to avoid or minimize injury.
- 1.6.6 Barrier Guard - a device that will prevent an operator or operators from reaching a "nip" or "pinch" zone.
- 1.6.7 Inching or Jogging (inch or jog button) - shall mean movement of rolls for short distances by use of an inch or jog button. The

inching or jogging button shall be so arranged that the rolls will move only while the button is held down.

- 1.6.8 Slow Speed - shall mean a roll speed which can be stopped within a distance of 24 inches or less, as measured on the surface of the roll.
- 1.6.9 High Speed - shall mean a roll speed which cannot be stopped within 24 inches or less, as measured on the surface of the roll.
- 1.6.10 Exposure - as used herein means it is physically possible for a man to get one or more fingers or other parts of the body into the nip or pinch zone.
- 1.6.11 Cold Rolls - any one or more rolls where the highest surface temperature of the roll does not exceed 150°F.
- 1.6.12 Hot Rolls - roll or rolls having a surface operating temperature in excess of 150°F. Where a hot and cold roll run together, it is necessary to consider the pair as "hot rolls," since the hot roll determines the extent of the potential hazard.
- 1.6.13 Continuous Automatic reversing - is that arrangement whereby the rolls start turning in the opposite direction after coming to zero speed upon application of the braking device; and such reverse rotation continues indefinitely until stopped by actuation of the "stop" button control.
- 1.6.14 Automatic Limited reversing - is when the braking action on a roll is followed by opposite rotation for a predetermined and preset distance only, which setting is made through a timer.
- 1.6.15 Inch-reversing - same as Paragraph 1.6.7, but in the reverse direction to normal rotation.

1.7 Power Guarding - All gears, belts, shafts and couplings shall be safeguarded in accordance with the Department Code for Safeguarding Mechanical Power Transmission Apparatus.

1.8 Working Areas - All working areas must be easily accessible and have level

flooring free from slipping and tripping hazards.

1.9 Lighting - All working areas shall be properly lighted in accordance with the Department Rules and Regulations Governing Lighting in Places of Employment.

1.10 Clearance - Clearance must be maintained between units to permit movement of transportation equipment and freedom of movement of operators.

1.11 Roll Guarding - All rolls covered by Paragraph 1.1 above shall be protected by isolation or barrier guarding as provided in Paragraph 1.12. In those cases where operators must have access to work on the rolls where guards are impracticable the roll drives shall be equipped with emergency stopping devices. In such cases, the allowable stopping distances and speeds shall comply with the applicable paragraphs of the detailed industry section of this Code. Where such specifications are not listed requirements shall be fixed by the Commissioner.

1.12 Barrier Guarding

1.12.1 All rolls provided with barrier guards as herein specified to eliminate exposure do not require emergency stopping devices.

1.12.2 Solid and unpierced guards or guards with openings or clearances not more than one quarter ($\frac{1}{4}$) inches may be used as close to the nip or pinch zone as desired.

1.12.3 Guards with openings for visibility, stock feed, or other uses shall be installed in accordance with the following distances from the nip or pinch zone as defined in Paragraph 1.6.4.

Maximum Barrier Opening in Inches	Minimum Distance from Pinch Zone in Inches
3/8	1 1/2
1/2	2 1/2
5/8	3 1/2
3/4	5 1/2
7/8	6 1/2
1 1/4	7 1/2
1 1/2	12 1/2
1 7/8	15 1/2
2 1/8	17 1/2

Maximum Barrier Opening
in Inches (Cont'd)

Minimum Distance from
Pinch Zone in Inches (Cont'd)

More than 2 1/8
Max. opening 6

30
More than 30

Note: When applying the above table to inrunning rolls, the nip or pinch zone begins at that point at which the distance between the surfaces of the rolls, when in contact is 3/8". Types of acceptable guard installations are shown in the appendix.

1.13 Protection by Location

When the nip or pinch zone is so located that persons cannot normally reach through, over, under, or around and come in contact with the pinch zone, neither barrier guarding nor emergency stopping devices will be required.

1.14 Where an exposure is created by the operation of a roll, an operator shall not be isolated but shall be within sight or hearing of other employees or a suitable alarm device so that assistance will be available in case of an accident.

SECTION II TYPE OF EQUIPMENT USED IN PLASTIC & RUBBER INDUSTRIES

- 2.1 Compliance - All requirements of Section I and the following rules of Section II shall apply to the type of equipment used in the rubber and plastic industries.
- 2.2 Horizontal Inrunning Roll Height - Where an operator handles material on the rolls, all horizontal inrunning rolls shall be installed so that the top of the operating roll is not less than 46" above the level on which the operator stands.
- 2.3 Emergency Stopping Devices - Except as permitted in Paragraphs 1.11, 1.12 and 1.13 all inrunning rolls shall be equipped with safety tripping devices located at points easily accessible to the operator, and connecting into the control of the machine in such a manner that a push or pull on the safety device shall bring the machine to a stop within the distance indicated in the applicable table in Paragraph 2.5. Location of these safety devices, shall be in compliance with Paragraph 2.4.
- 2.4 Tripping Devices
- 2.4.1 Horizontal Inrunning Rolls - Wire cable, chains and other nonstretching devices, that will operate by a Push or Pull, shall be provided at front and back of each set of rolls. The normal location of the safety trip over the operating roll shall be within 2 inches of a vertical plane tangent to the front of the roll and not more than 72 inches above the level on which the operator stands. The normal location of the safety trip over the rear roll shall be within 2 inches of a vertical plane tangent to the rear of the rear roll and not more than 72 inches above the level on which the operator stands.
- 2.4.2 Vertical Inrunning Rolls - Safety tripping devices shall be provided in front and back of all vertical inrunning

rolls to operate readily by a Push or Pull and shall be carried the full length of the roll. Safety tripping devices on vertical rolls shall be not more than 72" above the working floor level on which the operator stands. Each safety tripping device on vertical rolls shall have one chain or cable at each end of the roll. These chains or cables shall be carried to within 6 inches of the floor level and be effectively secured to the frame of the machine. Safety trip chains or cables shall be connected with the tripping devices and positioned at a distance not more than 12 inches from the face of the roll and at a distance not less than 2 inches from the machine frame.

2.5 Stopping Distances

2.5.1 New Installations

Every new installation of "slow" inrunning rolls shall stop when empty within the distances indicated in Table No. 1 of Paragraph 2.5.3 as measured on their surfaces in inches unless acceptable alternate safeguards are provided.

2.5.2 Existing Installations

Every existing installation of "slow" inrunning rolls, irrespective of size or speed, shall stop when empty within the distances indicated in Table No. 2 of Paragraph 2.5.3 as measured on their surfaces in inches unless acceptable alternate safeguards are provided.

2.5.3 Table of Stopping Distances

TABLE NO. 1
New Installations

TABLE NO. 2
Existing Installations

<u>Speed F/M</u>	<u>Surface Travel in Inches</u>	<u>Speed F/M</u>	<u>Surface Travel in Inches</u>
20	3.0	20	3.6
25	3.7	25	4.5
30	4.5	30	5.4
35	5.2	35	6.3
40	6.0	40	7.2
45	6.7	45	8.1
50	7.5	50	9.0
55	8.2	55	9.9
60	9.0	60	10.8
65	9.7	65	11.7
70	10.5	70	12.6
75	11.2	75	13.5
80	12.0	80	14.4
85	12.7	85	15.3
90	13.5	90	16.2
95	14.2	95	17.1
100	15.0	100	18.0
105	15.7	105	18.9
110	16.5	110	19.8
115	17.2	115	20.7
120	18.0	120	21.6
125	18.7	125	22.5
130	19.5	130	23.4
135	20.2	135	24.3
140	21.0		
145	21.7		
150	22.5		
155	23.2		
160	24.0		

2.6 High Speed Rolls

2.6.1 All rolls, protected in accordance with Paragraph 1.11 shall comply with the following requirements where the described conditions are present.

- a. Rolls requiring threading operations, where the operator is exposed to the nip or pinch zone during this operation, shall be equipped with emergency stopping devices that will stop the rolls in accordance with established distances for the threading speed used.
- b. Such inrunning rolls shall be provided with a barrier guard, mechanically or electrically interlocked to prevent operation of the rolls at high speed except when the guard is in place, and to prevent lifting or removing of the guard until the speed of the rolls has been reduced to a value that can be stopped within the allowed distance.

2.7 Electrical Equipment

- 2.7.1 Sequence Relays - Sequence relays shall be provided and arranged in a manner that, when the safety device is tripped, a complete starting cycle, including a reset, will be necessary in order to place the equipment back in service.
- 2.7.2 On all machines that use rolls, the starting control shall be located so that the normal operating area is clearly visible to the operator at all times.
- 2.7.3 All electrical equipment shall be installed in accordance with the Electrical Safety Rules of the Department and the National Electric Code.

2.8 Hot Rolls

Installations involving hot rolls may be equipped with the following roll reversing features. (See appendix).

- 2.8.1 Automatic limited reversing mechanisms shall be designed with electrical devices to eliminate reverse motion of the roll except during the emergency stopping interval. Such reversing mechanisms shall limit the reverse motion of the rolls to no more than one (1) revolution.
- 2.8.2 Manual inch reversing mechanisms may be used to reverse hot rolls provided the reverse motion can be effected only after the emergency brake system has been actuated and provided further that the inch reversing button is located in view of the rolls.
- 2.8.3 Automatic continuous reversing mechanisms as defined in Sub-Paragraph 1.6.13 shall not be used.

2.9 Inspection and Testing

- 2.9.1 All roll installations equipped with emergency stopping devices should be tested daily for operability. All such equipment shall be tested and inspected for conformance to these rules at least once per month.
- EXCEPTION: Roll installations equipped with wholly electrical braking devices need be tested by measurement of stopping distances only once every three months.
- 2.9.2 Stopping distances shall be determined in terms of inches of peripheral travel of the roll from the instant of actuation of the emergency stopping device.
- 2.9.3 A written record of the stopping distances shown by these tests during the previous twelve (12) months shall be maintained at all times by the employer for inspection by representatives of the Department.