



# SAFETY INFORMATION

# Extrusion Coating & Laminating Safety

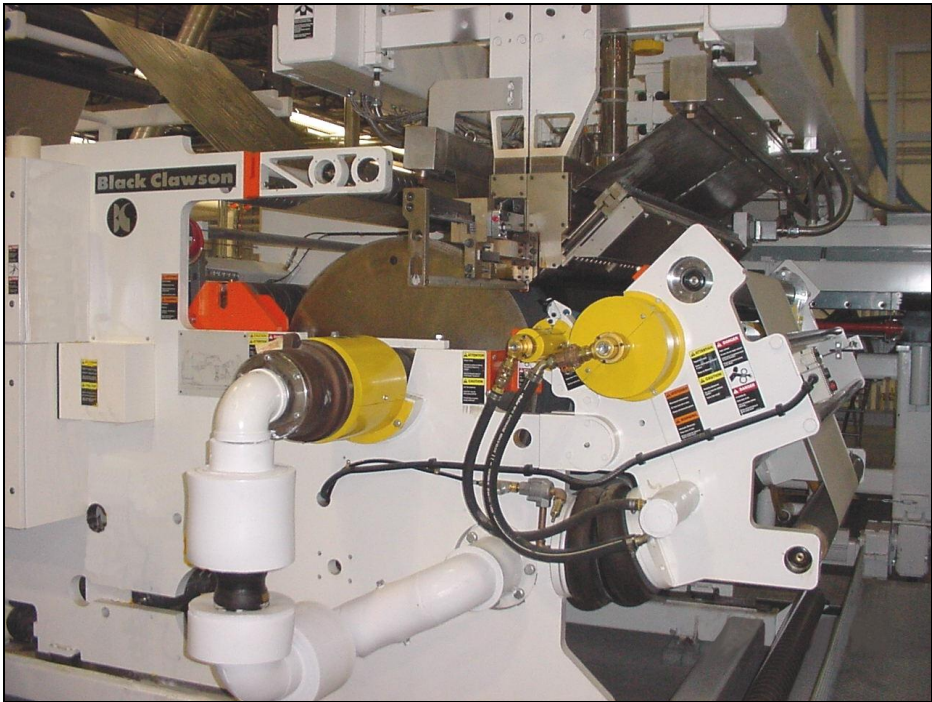


Figure (1), Extrusion Coating - Laminating Station

## INTRODUCTION

The purpose of an extrusion coating - laminating station is to coat one web or laminate one web to another web with molten plastic. The webs are typically films, foils, paper, board, or other products. The molten plastic, often called a melt curtain, is extruded from a die. The web or webs and melt curtain are brought

together between a chill roll and a pressure roll. Heat is removed from the plastic by the chill roll, resulting in a bond between the plastic and web(s). See Fig. (1) for an Extrusion Coating - Laminating Station.



# SAFETY INFORMATION

## WARNING IN-RUNNING NIP POINTS

Operators must be aware of and avoid in-running nip points. The preferred method for protecting the operators from the hazards of in-running nips in the laminating process area is to provide a barrier guard with an interlocked access gate that provides protection from all the in-running nips (those nips between the chill roll, stripper roll, pressure roll, back-up roll and possibly the lead-in roll as shown in Figure 2b).

A solenoid locking switch on the access gate is used to prevent the gate from being opened while the machine is in operation.

When manually adjustable die deckles are used for changing die width, extensions must be added to the deckle assembly as to allow the operator to perform the adjustments outside the barrier guard.

Figure (2a) shows a laminator barrier guard.

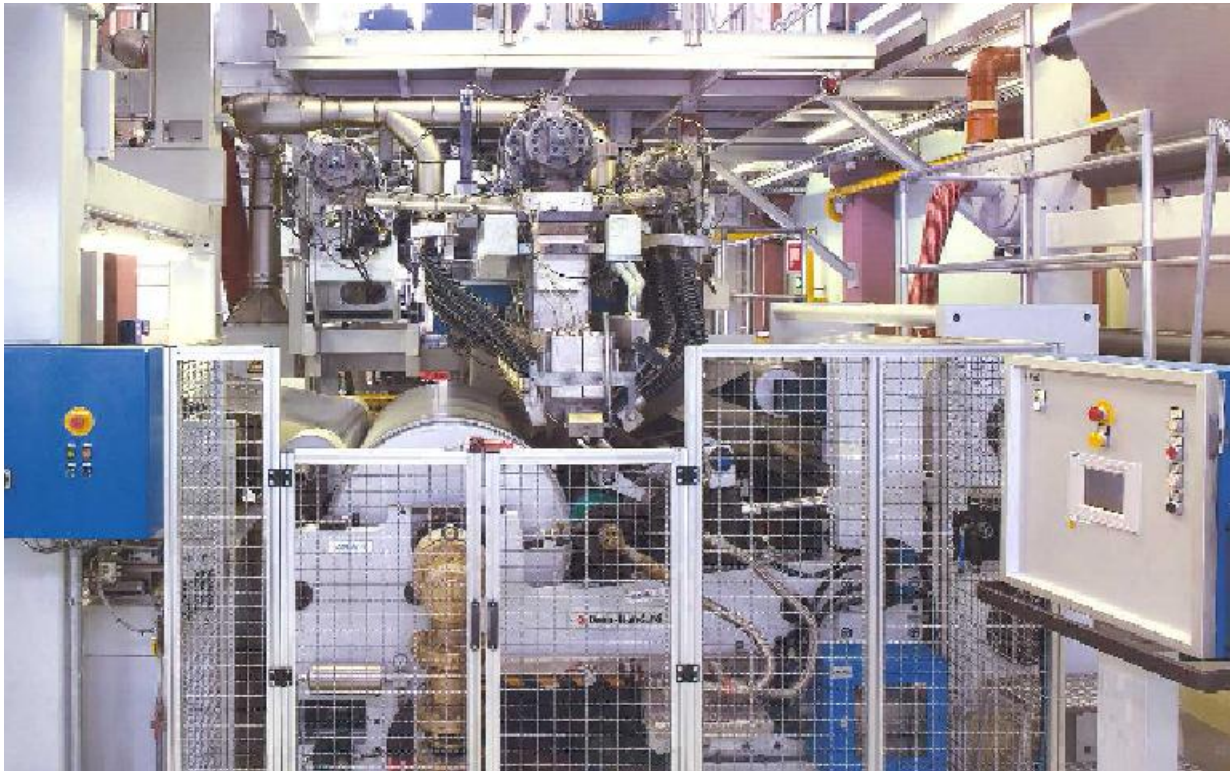


Figure (2a), Extrusion Coating – Laminating Station with Barrier Guards



# SAFETY INFORMATION

## WARNING IN-RUNNING NIP POINTS CONTINUED

In some installations, the use of a barrier guard may not be possible due to the location of peripheral equipment. In these instances, in-running nip points must be adequately guarded to prevent accidental contact by personnel working around the extrusion coating-laminating station.

Figure (2b) shows nip points and nip point guards.

**FAILURE TO GUARD IN-RUNNING NIP POINTS CAN RESULT IN SERIOUS PERSONAL INJURY OR DEATH.**

## WARNING PULL ROLL NIP POINTS

Pull rolls may be used to isolate web tension sections of the extrusion coating-laminating station. The in-running nip side of pull rolls must be guarded across their full width.

**FAILURE TO GUARD IN-RUNNING NIP POINTS CAN RESULT IN SERIOUS PERSONAL INJURY OR DEATH.**

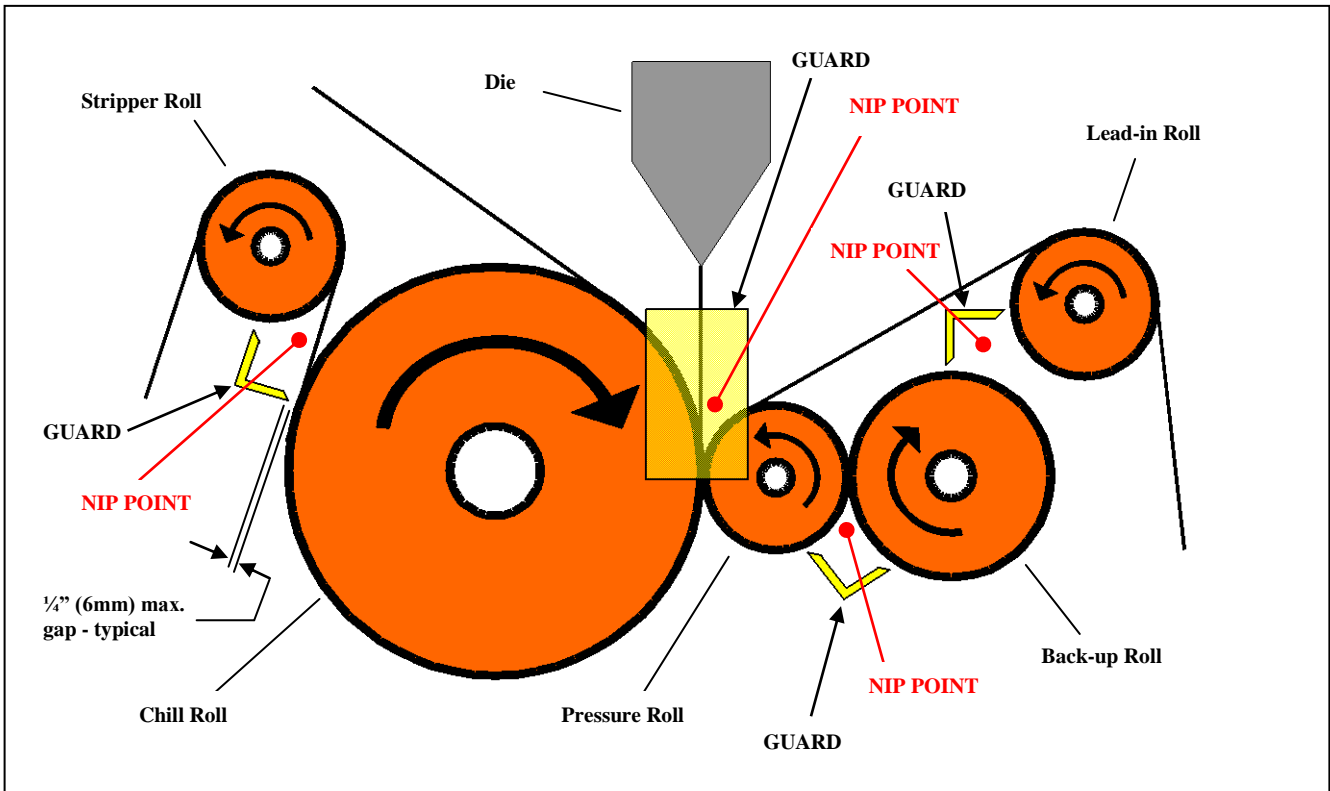


Figure (2b), Extrusion Coating – Laminating Station Nip Points with Guards



# SAFETY INFORMATION

## WARNING DIE AREA

Figure (3) shows the die in close proximity to the chill roll and to the moving webs. It also shows the melt curtain flowing from the die into the nip point.

The relationship between the die and nip point is frequently changed for process reasons. The nip points between the die and rolls are protected from operator access by the interlocked barrier guard during operation. When a barrier guard is not feasible, a nip guard to fully protect the circled area and still operate the coater-laminator is not practical. In these instances, a nip point guard must be added.

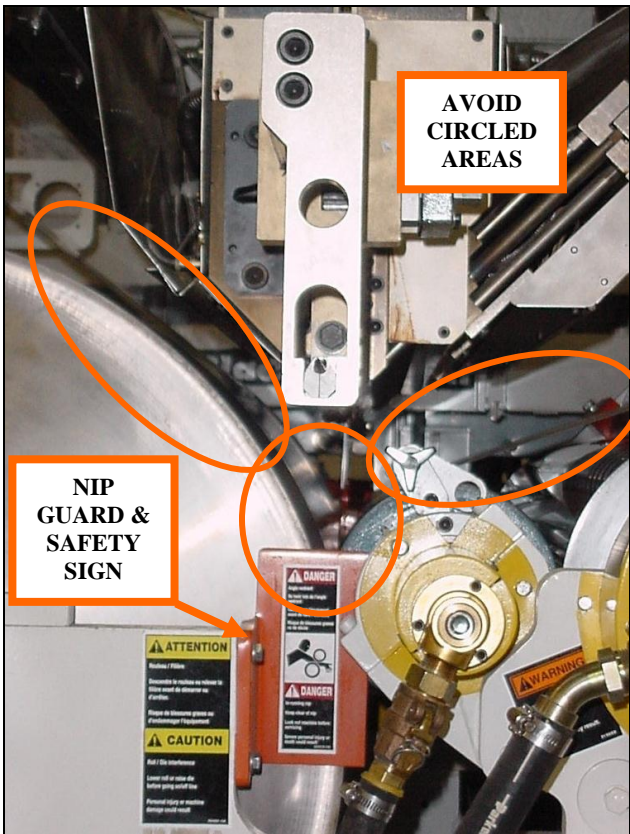


Figure (3) Die / Coater-Laminator Hazards

Figure (3) shows a nip point guard with safety sign that is to be used if a barrier guard cannot be provided. The guard must be installed at each end of the chill roll to block direct access to the nip.

**FAILURE TO AVOID THESE AREAS AND INSTALL THE BARRIER GUARD OR THE CHILL ROLL NIP GUARDS COULD RESULT IN SERIOUS PERSONAL INJURY.**

## WARNING ROTARY UNION

Cooling media is introduced into the chill roll and other rolls through rotary unions in order to remove heat from the product. Some of these rotary unions may have exposed fasteners or other surface features that may create a hazard if located within reach. Where such hazards exist within reach, they must be guarded. Figure (4) shows guarding of a chill roll rotary union.

**FAILURE TO GUARD THIS AREA CAN RESULT IN SERIOUS PERSONAL INJURIES.**



Figure (4) Rotary Union Guard



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## DANGER DIE GAP CLEANING

During operation of the extrusion coater-laminator, the internals of the die may become contaminated resulting in impurities in the melt curtain. If this happens, the extruder station must be taken off line and the die cleaned. NEVER attempt to clean the die or die gap while the extruder station is on line (positioned over the coater-laminator station).

**FAILURE TO FOLLOW THESE SAFETY RECOMMENDATIONS COULD RESULT IN SERIOUS PERSONAL INJURY**

## WARNING DROOL REMOVAL

On occasion on older style extrusion dies, drool from the edge of the die will appear during normal operation. If the drool is allowed to drip into the nip it may damage or spoil the product. To prevent spoiling the product operators will manually remove the drool. This edge drool is hot. Operators must never remove drool by hand even with the hand protected by a glove. Always use a tool to protect the operator from the hot polymer and the in-going nip located below the die.

**FAILURE TO USE A TOOL FOR EDGE DROOL REMOVAL COULD RESULT IN SERIOUS PERSONAL INJURY.**

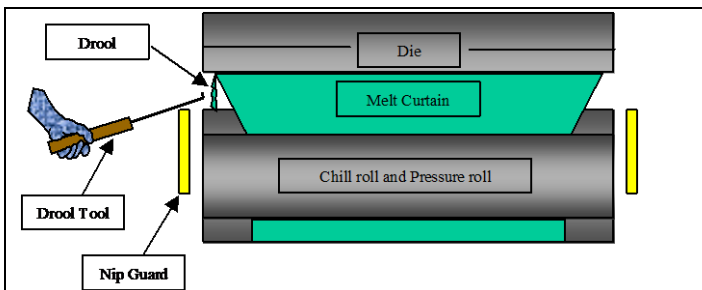


Figure (5) – Example use of a drool tool.

## WARNING ROLL WRAP-UPS

In the event of a roll wrap-up, NEVER attempt to remove the wrap-up while the machine is running. When a wrap-up occurs, immediately shut the line down and back the extruders off line. On newer machines, the chill roll drive is provided with a reverse jog pushbutton to enable the operator to remove the wrap-up from outside the machine. If the operator must enter the machine to remove the wrap-up, open the nip and lock out the air supply and drive before attempting to remove the wrap-up. Use caution in removing the wrap-up so as not to damage the roll surfaces.

**FAILURE TO FOLLOW THESE SAFETY RECOMMENDATIONS COULD RESULT IN SERIOUS PERSONAL INJURY OR MACHINE DAMAGE.**

## WARNING ROLL REPLACEMENT

Rolls may require replacement because of damage or because a product change requires a different surface feature. Before changing a roll, shut the line down, open the nips, and lock out the drive and control system. If the roll is a cooled roll, valve off the cooling supply and return. Use appropriate lifting equipment and proceed with caution. Do not remove your lockouts until all guards are securely in place and personnel in the area are clear.

**FAILURE TO FOLLOW THESE SAFETY PROCEDURES COULD RESULT IN SERIOUS PERSONAL INJURY OR MACHINE DAMAGE.**



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## WARNING TEFLON BELT SYSTEM

Teflon belt systems are sometimes used to help prevent wrap-ups on the pressure roll from heavy edge bead. Before replacing a belt, shut the line down, open the nips, and lock out the drive and control. Do not remove your lockouts until the belt is securely in place and all personnel in the area are clear.

**FAILURE TO FOLLOW THESE SAFETY PROCEDURES COULD RESULT IN SERIOUS PERSONAL INJURY.**

## WARNING INFRARED HEATER

Infrared heaters are used to help promote adhesion to some webs. The heating elements are very hot. Never place your hand at the point where the web passes under the heater. Do not expose yourself to the element side of the heater unless the power is locked out and the unit has cooled. Keep a fire extinguisher in the immediate area.

**FAILURE TO FOLLOW THESE SAFETY PROCEDURES COULD RESULT IN SERIOUS PERSONAL INJURY OR PROPERTY DAMAGE.**

## DANGER HIGH TEMPERATURE POLYMER

The melt curtain exiting the die is extremely hot and could be in the range of 600° F (315°C). Keep clear of the polymer at all times even when off machine drooling. Even a slight draft is enough to blow the melt curtain a few feet and onto any person in the near vicinity.

**FAILURE TO KEEP CLEAR OF THE EXTRUDED POLYMER WILL RESULT IN VERY SERIOUS BURNS TO THE BODY.**

## WARNING SLITTERS

Slitters are used to trim the edges of the product. Slitters are sharp by their very nature and must be guarded when not in use, avoided when in use, and handled with cut resistant gloves during replacement and sharpening.

**FAILURE TO FOLLOW THESE SAFETY RECOMMENDATIONS COULD RESULT IN SERIOUS PERSONAL INJURY.**

## WARNING OZONE

Ozone generators are used to help promote adhesion to some webs by flooding the nip point with the invisible gas. Ozone in sufficient concentrations is known to cause headache, nausea, and may result in more serious breathing difficulties in cases of very high concentrations. Ozone use must be carefully monitored and any excess must be ducted out of the area. Ozone generators must be interlocked to prevent operation if the exhaust system is off or off line.

**FAILURE TO PROVIDE INTERLOCKS AND TO FOLLOW THESE SAFETY RECOMMENDATIONS COULD RESULT IN PERSONAL INJURY.**



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## WARNING INSERTING SLIP SHEETS

To check for the extruded polymer coat weight or adhesion, operators have been known to insert a "slip sheet" by hand at the in-going nip below the die as illustrated in figure (6a). **This is a dangerous practice and must be discontinued.**

The slip sheet must be attached to a new product roll at the unwind prior to splicing. If this is impractical operators must use a tool for inserting the "slip sheet" similar to the one illustrated in figure (6b).

**FAILURE TO FOLLOW THESE SAFETY RULES COULD RESULT IN SERIOUS PERSONAL INJURY.**

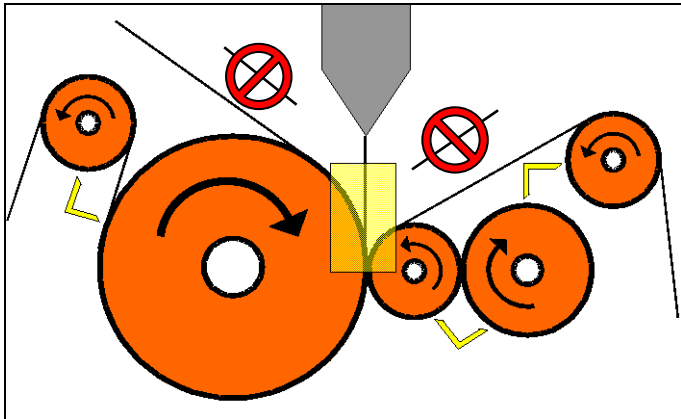


Figure (6a) – Do not insert slip-sheets in the area indicated.



Figure (6b) Retrieving Tong

## WARNING CARRIAGE RETRACTION

The extruder(s) and die are usually mounted on a carriage base that can be retracted to an off line position for die cleaning, threading up, or for other purposes. These carriages must be provided with pre-motion and motion alarms, audible and visual, as well as a stop cord on each end to minimize the risk of injury to unseen persons. Exposed wheel to track nip points must be guarded for both directions of travel. Personnel must stay clear of moving carriages.

**FAILURE TO STAY CLEAR OF MOVING CARRIAGES AND TO PROVIDE ALARMS, STOP CORDS, AND GUARDS COULD RESULT IN SERIOUS PERSONAL INJURY.**

## WARNING DRAW-DOWN ADJUSTMENT

The relationship between the die and the chill roll is adjustable for optimum performance and to minimize the risk of machine damage when going on and off line. Operators must ensure that personnel are clear before making adjustments. Safety signs and orange color-coded components must be provided to warn of immediate hazards, such as crushing between the moving component and the stops, frame, floor, or other non-moving component.

**FAILURE TO HEED THE WARNINGS COULD RESULT IN SERIOUS PERSONAL INJURY.**



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## DANGER HIGH VOLTAGE

Extrusion coating - laminating stations are powered by electric drives and controlled by electrical and electronic devices. These drives and controls must be properly grounded and all wiring checked periodically for loosening or damage and replaced if necessary. **LOCK OUT POWER BEFORE** servicing any electrical device, motor, or cabinet.

In some instances it may be necessary to troubleshoot inside a drive or control cabinet with the power on. Only **QUALIFIED PERSONNEL** trained to work with the power on should be allowed to bypass lockouts for troubleshooting purposes.

**FAILURE TO FOLLOW THESE RECOMMENDATIONS WILL RESULT IN SERIOUS PERSONAL INJURY OR DEATH.**

## WARNING LOCKOUT TAGOUT

All personnel must be trained in the proper procedures for lockout. Refer to OSHA Subpart J 1910.147. Lockout and tagout devices must identify the employee applying the device.

All drives must be de-energized and locked out, all controls must be locked out, and all systems de-energized before performing any work on the equipment by any personnel.

Where programmable logic controllers (PLCs) are being worked on, disable and lock out all output functions. Test all logic changes under controlled conditions. Do not make changes without first consulting Davis-Standard, LLC since even simple changes may create a hazard.

After maintenance is completed, replace all guards that were removed and ensure that no unsafe condition exists and that all personnel are clear of the equipment before removing the lockouts and activating the controls.

**FAILURE TO FOLLOW THESE PROCEDURES MAY RESULT IN SERIOUS PERSONAL INJURY OR DEATH.**

## WARNING ROTATING SHAFTS

All power transmission equipment such as shafts, couplings, gears, pulleys, belts, etc. must be guarded in accordance with OSHA Regulation Subpart O 1910.212 & 219

Never wear loose clothing near rotating power transmission components. Long hair should be up and covered with a hat.

## WARNING POLYMER FUMES

As the melt curtain flows from the die to the nip, it gives off fumes. These fumes in sufficient concentrations are known to cause eye and skin irritation and, depending upon the type of polymer, may cause more serious breathing difficulties. Consult the MSDS for the polymer being used to determine the optimum processing temperature and safety measures to follow. Keep the fume removal system operating whenever the melt curtain is present.

**FAILURE TO FOLLOW THESE SAFETY RECOMMENDATIONS COULD RESULT IN PERSONAL INJURY.**





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## WARNING THREADING

All nips must be open and the machine stopped before threading is started. With the base product threaded through to the coater – laminator, attach it to the chill roll with a magnet or tape and jog the chill roll drive until the base product is brought past the stripper roll. Remove the magnet or tape and thread the base product through to the winder. If laminating, the laminate web can then be threaded, with the nips open and the machine stopped, to the chill roll and attached to the base product with tape. When this is complete and all personnel are clear, the nips can be closed, the line started, and the extruder(s) brought on line. Once the melt curtain is fully established and the product meets specifications, a roll change at the winder can be made and the off specification material can be disposed of.

**OPEN ALL NIPS AND STOP THE DRIVE BEFORE THREADING THE PRODUCT THROUGH THE MACHINE. FAILURE TO FOLLOW THESE SAFETY INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY.**

## WARNING EMERGENCY STOPS

Extrusion Laminators must be equipped with devices that will stop the machine quickly in an emergency. These emergency stops must be located so any person working on the machine can quickly disconnect the machine section, or the entire machine from the source of power in case of an emergency.

Emergency stop devices shall be red and emergency stop buttons shall have a yellow background.

Emergency stop devices should be tested periodically to make certain they are operational at all times.

Emergency stops are not safety devices that can prevent an accident and must never be used as an operational tool.

All employees must be made aware of the emergency stops in their work area as part of their safety training.

## WARNING MAINTENANCE

Review the following safety rules before performing maintenance on the equipment.

- Lock out all drives and controls before working on the machinery.
- All non-operating personnel are to be out of the area before activating drives and operating controls. Mirrors should be used to provide the operator with a view of the drive side area.
- Inspect slings and cables for worn or weak spots before using them. Keep all personnel out from under machine components when lifting. Do not allow chains or other lifting devices to hang in the aisles.
- Do not walk under machinery, rolls, or other items being transported by overhead crane equipment.



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## WARNING MAINTENANCE - CONTINUED

- Do not depend upon hydraulic or pneumatic devices to hold equipment in a raised position while performing maintenance. Pin, chain, or block in a raised position.
- Inspect chains and clevis pins at frequent intervals for wear and damage. Block under or around units raised by chains when performing maintenance to prevent injury to personnel.
- Attach the sling securely when attempting to lift machine components. Rotation of out-of-balanced pieces could be hazardous.
- Release pressure from hydraulic and pneumatic systems and lines before disassembly. Fluids and gases under pressure can be dangerous to personnel in the area.
- Lock out all power before changing out knife blades. Use protective gloves.
- Cover roll surfaces to prevent damage before removing them from the machine and keep them covered during transport and storage.
- Be sure that all slings and cables are designed to lift the loads taking into consideration the angles of the hookup and the load to be lifted.
- Use lifting points as specified by manufacturers. Where provisions have been made for lifting eyes to be screwed into a tapped hole, make certain that eyebolt is tightened to the shoulder and that eye is parallel to the lifting plane to prevent breakage.
- Personal articles are not to be stored in electrical switch boxes, panels, or in other potentially hazardous places.

- All drain covers and barricades must be replaced over and around openings before returning function to operation.
- Safety interlocks must be checked for proper operation as part of regular maintenance schedules.

## WARNING OPERATION

Review the following safety rules before operating the extrusion coater - laminator.

- Do not remove or cover warning signs. They are installed to warn personnel of possible danger. Observe all instructions given on the signs.
- Observe all color-coding. **ORANGE:** This color indicates hazards on the machine, which might cause personal injury, and to be avoided during operation. **YELLOW:** This color indicates caution and is used for marking physical hazards such as falling and tripping, etc. Examples would be fixed guards, crosswalks and steps.
- Footwalks, handrails, barriers, and guards must be in place before starting the machine.
- Do not over-reach, climb, or stand on places other than properly designed and designated ladders, steps, or walkways.
- Aisles must be clean and clear of obstructions. Wipe up spilled oil, grease and water. Good housekeeping prevents injuries.



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## WARNING OPERATION - CONTINUED

- Keep clothing and all parts of the body away from in-running nips, traveling belts, gears, ropes, and rotating or pivoting loading mechanisms.
- Beware of head-high obstacles in and around the machinery area. Wear proper head protection when indicated.
- Exhaust blasts from air motors may blow dirt, scale, or other foreign materials into eyes causing eye injury. Wear proper eye protection.
- Keep all parts of the body away from rotating drive components.
- Do not walk or crawl under operating equipment.
- Any in-running nip point on converting machinery is a hazard. Keep clothing and all parts of the body away at all times. And especially do not wear loose clothing that could become entangled in the roll nips.
- Do not operate equipment until all personnel are accounted for and outside of safety lines.
- Guards should be provided for all exposed bolts or nuts on rotating equipment. Rotating bolts or nuts may catch clothing or loose web. Use caution in these areas while the machine is running. Never climb between guards and moving machinery.
- Keep hands away from belt and chain drives. Make certain that all guards on drive components are in place.
- When threading machinery, feet must be squarely and properly placed for adequate balance.
- Never thread to an in-running nip by hand.

## WARNING UNSAFE PRACTICES

To avoid injuries, operators and other personnel should be aware of and avoid the following:

- Unguarded in-running nip points.
- Unguarded wrap points.
- Unguarded pinch or crushing points.
- Unguarded rotating machinery.
- Unguarded moving members.
- Unguarded slitters.
- Inadequate barriers.
- NEVER clean die gap while extruder station is on line.
- NEVER replace Teflon belts while machine is in operation.
- NEVER attempt to remove edge bead wrap-ups or other material while machine is in operation.
- Moving parts and parts capable of moving.
- Improper handling of trim or web during a break.
- Improper threading of machine.
- Failure to ensure the area is clear of personnel before starting the machine.
- Failure to lock-out and de-energize when working on or repairing the equipment.
- Inadequate lighting or safety signs.
- Removal of handrails and guarding.
- Improper use of footwalks, crosswalks, access steps, ladders, etc.
- Poor maintenance of hoist equipment.
- Poor housekeeping, failure to keep working and traffic areas free of scrap and other slipping or tripping hazards.
- Failure to read, understand, and follow the instructions.



# SAFETY INFORMATION

## Safety Signs

### INTRODUCTION

Operators of Davis-Standard, LLC machinery, where practical and appropriate, may be protected from certain hazards by a physical barrier and may in addition, be warned of those hazards by the placement of Safety Signs. These signs alert persons to the degree or level of the hazard, the nature of the hazard, to how the hazard can be avoided, and the consequences of involvement with the hazard.

The following examples illustrate the ANSI Z535 standard series format for product safety signs and labels. These standards must be referred to when designing safety signs and labels. Not all safety signs will have a pictorial panel.

Color-coding for the words DANGER, WARNING, CAUTION, and SAFETY INSTRUCTION is important for the identification of the hazard level.



**DANGER** – (white letters with a red background) indicates an immediate hazard that if not avoided **WILL** result in death or serious injury. This should be limited to the most extreme situations.



**WARNING** – (black letters with an orange background) indicates a potential hazard that if not avoided **COULD** result in death or serious injury.



**CAUTION** – (black letters with a yellow background) indicates a potential hazard that if not avoided **MAY** result in minor or moderate injury.



**SAFETY INSTRUCTION** – (white letters with a green background) is used to convey multiple messages stating procedures or actions that must be followed for the safe operation of the product.



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## DUAL LANGUAGE

The ANSI Z534.4 Product Safety Sign and Label standard provides a suggested format for multi-lingual safety signs. International and European Union standards require safety signs to be in the official language of the country in which the machine is to be used.

Davis-Standard, LLC has a number of ANSI format, dual language, safety signs for use in countries where English is not the official language.

## AVAILABLE SAFETY SIGNS

The following safety signs are available for your Davis-Standard, LLC machine. Other safety signs may be available, including dual language. Signs can be made for situations not covered by those listed below. Contact Davis-Standard, LLC for additional information on availability, sizes, material, and placement.

Safety signs are never to be used in lieu of guarding where guarding is feasible.

PART #	HAZARD
424656	Confined space.
424650	Hazardous voltage
424632	Roll to roll nip
424645	Belt or chain nip
424661	Pinch point
424653	Automatic movement
424647	Rotating equipment
424692	Hazardous area
424663	Shear and crushing point
424670	Web edges and wrap points
424638	Fixed member nip
424651	Multiple electrical sources
424672	Unexpected machine motion

PART #	HAZARD
424743	General safety instructions
424655	Airborne contamination
424699	Static electricity
424646	Gear nip
424668	Equipment above
424687	Hot surface area
424667	Low clearance
424708	Hot fluids
424700	Radiation
424652	Electrical grounding
424686	Hot water or steam
424649	Do not remove guard/Guard removed



# Reference Information

All machine operators, maintenance and supervisory personnel should read and understand not only the selected OSHA sections listed, but also all applicable OSHA codes pertaining to their job duties and functions.

OSHA and ANSI standards are updated periodically and the section numbers may change. The following references are correct at the time of printing. Owners of machines should be aware of the most recent standards applicable to their machine.

## OSHA REGULATIONS

The following list of regulations from OSHA CFR 29, Section 1910 is for your reference. OSHA regulations are available on line at [www.osha.gov](http://www.osha.gov).

**Subpart G** – Occupational Health  
§95 – Noise exposure

**Subpart I** – Personal Protective Equipment  
§133 – Eye and face protection  
§134 – Respiratory protection

**Subpart J** – General Environmental Controls  
§146 – Confined Space  
§147 – Lockout Tagout.

**Subpart N** – Material Handling  
§179 – Overhead cranes

**Subpart O** – Machinery & Machine Guarding  
§212 – General requirements  
§219 – Power transmission

**Subpart R** – Special Industries  
§261 Pulp Paper and Board Mills.  
(a) General Requirements  
(b) Safe Practices  
(k) Machine Room  
(i) Finishing Room

**Subpart S** – Electrical  
§303 – General requirements

## ANSI STANDARDS

The American National Standards Institute publishes several consensus standards of interest to machinery users.

**B151.2** – Film Casting Machines  
**B151.3** – Screen Changers  
**B151.5** – Film and Sheet Winding Machinery  
**B151.7** – Extrusion Machinery  
**Z534.4** – Safety Signs and Labels



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## NATIONAL & INTERNATIONAL STANDARDS

The International Standards Organization (ISO) and the International Electrotechnical Commission (IEC) list many standards of interest as does the European Union whose standards are nearly identical. In addition, many countries promulgate their own standards. A source for many of these can be found at [www.global.ihs.com](http://www.global.ihs.com).

## INSTRUCTION MANUALS

It is essential that operators be thoroughly trained in extrusion coating – laminating safety and the procedures applicable to the process in which they are involved.

Davis-Standard, LLC provides instruction manuals with all machine orders. All operators should read and understand the information in these manuals before operating the machine.

**LACK OF PROPER TRAINING AND UNDERSTANDING CAN BE A MAJOR CAUSE OF SERIOUS PERSONAL INJURY.**

## IMPORTANT INFORMATION

**For help on how to safely operate your Davis-Standard, LLC Extrusion Coater - Laminator or for such assistance or help with guarding extrusion coaters - laminators manufactured prior to March 15, 2003 by The Black Clawson Company or Black Clawson Converting Machinery LLC or any extrusion coaters - laminators manufactured by Black Clawson Converting Machinery, Inc. or Egan Machinery, contact:**

Davis-Standard, LLC  
46 North First Street  
Fulton, NY 13069, USA  
Telephone – (315) 598 7121

Please locate the serial number plate on the machine in question and write down the drawing number, order number and serial number, if any. This will greatly expedite locating information on your specific machine.

Drawing No.  
\_\_\_\_\_

Order No.  
\_\_\_\_\_

Serial No.  
\_\_\_\_\_

