

# ENGEL 800 SERIES ROLLFORMER

## INSTALLATION, OPERATION & MAINTENANCE MANUAL



**ENGEL**   
**INDUSTRIES**

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## SAFETY SUMMARY

### INTRODUCTION

**Safety is everyone's business.** Whether you are an equipment operator, a maintenance person, a supervisor, or business owner, you are directly responsible for the day-to-day safe operation of your Engel equipment. It is your responsibility to maintain and operate this equipment in strict compliance with all applicable laws, safety regulations, and the manufacturer's recommended procedures.

### PROMOTING SAFETY

**Institute a company safety program.** The formation of an organized safety program is strongly recommended. This safety program should include the formation of a safety committee to review and update company safety policies on a regular basis. Establish a firm policy on safety regulations in the work place. Publish these objectives, spelling out each employee's responsibilities. **Make certain that each employee knows what is expected of them.**

### SAFETY PROGRAM

**The following steps are suggestions** that a company developing, or expanding, a comprehensive safety program should consider:

1. Engel Industries carefully design safeguards into their products in order to minimize hazards. However, the manner in which equipment is incorporated into a manufacturing process may inadvertently create a hazard or otherwise defeat built-in safeguards. Closely examine the operation of your company's processing equipment. Take notice of potential hazards. Install guards or take other appropriate action to eliminate hazard risks.
2. Make certain equipment operators and maintenance personnel are properly trained.
3. Setup a program of daily, weekly, and monthly machinery inspection. Make a check list. Keep a historical record of all maintenance work, repairs, and adjustments.
4. Frequently evaluate safety guards and devices during actual production runs. **Correct any unsafe practice or situation immediately.**
5. Establish safe, convenient material handling systems. If conveyor equipment is installed in your facility, it should conform to recommendations published in the 'American National Standard, Conveyors and Related Equipment, Safety Standards for ANSI/ASME B20.1' which are available from the American National Standards Institute (ANSI).
6. Provide personal protective equipment, such as safety glasses with side shields, safety helmets, tongs, gloves, hand pads, spats, and protective sleeves, as required to suit the operation.
7. Organize a company safety committee. Schedule periodic meetings on a regular basis to review and update all safety policies.
8. Establish a firm policy on safety regulations in the work place. Publish these objectives, spelling out each employees responsibilities. **Make certain that each employee knows what is expected of them.**
9. Investigate all accidents and close calls. Take immediate action to prevent a recurrence of the incident. Keep records of the investigation and the corrective measures taken.

10. Post a list of names, addresses, and phone numbers of physicians and others who are to be called in emergency situations.

## CUSTOMER'S RESPONSIBILITIES

There are certain hazards associated with the operation of any equipment or system of machinery that are impractical, *if not impossible*, for equipment suppliers to safeguard. The user must address these hazards and be responsible for providing guards or barriers for establishing appropriate work procedures and for training personnel in the safe operation of that equipment.

With respect to coil and strip processing equipment, the following hazards should be noted:

- Open pits and depressions or raised areas in the floor.
- Space between machines, where strip edges and ends are exposed during feed-up, run, and tail-out conditions. This includes carry-over tables and both roller and belt conveyors.
- Nip and pinch points of machinery, coils, and strip which may be exposed in feed-up, run, and tail-out.
- Areas surrounding coil handling devices where coils are in motion.
- Areas surrounding payoff reels and recoilers, where clock-springing strip ends present a hazard during banding, un-banding, feed-up and tail-out conditions.
- Sheet and pack handling devices (*including conveyors*) where the motion, as well as shifting of sheets or packs, may present a hazard.
- The area surrounding sheet stacking devices, which must be approached for setup, but which should be clear of personnel during operation because of moving machinery or material.
- Areas associated with high temperatures, high pressure fluids (*hydraulic, air, or water*) and electrical devices and connections.
- The vicinity of machinery which moves into or out of the line.

## REFERENCE SOURCES

Questions concerning specific hazards or safeguarding of equipment may be addressed to the equipment manufacturer. For additional information, refer to the sources listed here:

### American National Standards Institute (ANSI)

**ANSI B11.18**, "Machinery and Machine Systems for the Processing of Coiled Strip, Sheet and Plate - Safety Requirements for Construction, Care and Use." **ANSI B11.4**, "Shears: Safety Requirements for Construction, Care and Use." **ANSI B11.14**, "Coil-Slitting Machines/Systems Safety Requirements for Construction, Care and Use." **ANSI B11.18**, "Machinery and Machine Systems for the Processing of Coiled Strip, Sheet and Plate - Safety Requirements for Construction, Care and Use."

### National Fire Protection Association (NFPA)

**NFPA 79**, "Electrical Standards for Industrial Machinery."

### European Union

"Directives on Safety of Machinery" and "CE Marking"

## WARNING LABELS

Warning and safety related informational labels are placed on the Engel Industries Industries' equipment at strategic points. It is important that these labels not be removed, covered, hidden, or defaced. The purpose of these labels is to alert personnel to potential personal injury hazards or *other* direct or indirect safety concerns.

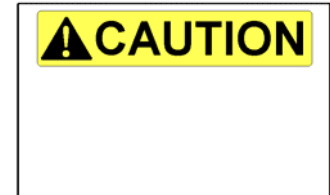
**DANGER** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



**WARNING** indicates a potentially hazardous situation which, if not avoided, could result in minor or serious injury.



**CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



**NOTICE** indicates a company policy that relates directly or indirectly to the safety of personnel or protection of property.



It is important that the meaning of a safety sign be clearly understood by contact with the hazard. To increase the understanding of a safety sign, the ANSI Z535 committee encourages safety sign manufacturers and owners of facilities to publish and exhibit the following (*above*) information on safety posters, safety bulletins or the like. Doing so will assist in the objective of achieving a national uniform system for the recognition of potential personal injury hazards and accident prevention." - ANSI Z535.2, Annex A1

## WARNING MESSAGES IN THIS MANUAL

Throughout this manual various **▲DANGER**, **▲WARNING**, **▲CAUTION**, and safety related **▲NOTICE** appear. The intent is to alert operator and maintenance personnel to potential hazards. In addition, *important* operation and maintenance details are emphasized with the **▲NOTE** heading.

## SAFETY FIRST

# ENGEL INDUSTRIES

The equipment in this line was designed and manufactured for a specific task. **DO NOT** use the equipment for any other function or to process material that is beyond the equipment's design specifications. Modifications or additions to this equipment line should not be made without first consulting Engel Industries. Replacement and maintenance parts should be equal to original equipment. Use of other parts may result in unsafe operating conditions. If there is a question as to the suitability of a part, Engel Industries should be consulted.

In general, every piece of equipment must be treated as dangerous. While operating or maintaining this equipment, each person must be aware of their own safety as well as the safety of all others around the line.

## **Material Coils**

Coils present numerous hazards. They may shift, roll or fall without warning. Some coils may spring open without warning. Sharp edges of the strip in the coil are hazardous. Stay clear of coils as they are being moved. Use extreme caution any time a coil is approached or handled.

## **Metal Strips**

The metal strip may have sharp or ragged edges. The strip is under tension and is subject to abrupt tension changes. This can result in strip breakage with the ends flying without warning. Stay clear of the strip whenever possible. When it is necessary to approach or handle the strip, use extreme caution. Use protective devices such as tongs, gloves, eye protection, and wrist guards as required for safety. The strip presents many pinch hazards with the machinery. Stay clear of these. Never step on or over strip in the line.

## **Machinery**

Never reach into any piece of machinery which is operating or which is capable of operation. Loose clothing or jewelry should be kept clear of machinery at all times. When working on one piece of equipment, be aware of hazards of surrounding equipment. Any item inserted into a machine may be thrown or may cause a dangerous malfunction or breakage.

## **Safe Guards**

No equipment should be operated unless the safe guards or devices supplied with the product are securely in place and properly adjusted.



## **⚠️ WARNING**

**ENGEL has conducted hazard evaluation and risk analysis studies for their products. *Safe guards installed on the equipment are there for a reason.* BEFORE EQUIPMENT IS PLACED INTO SERVICE, ALL SAFE GUARDS OR DEVICES MUST BE IN PLACE AND PROPERLY ADJUSTED.**

### **Maintenance**

Before performing any maintenance on a piece of equipment, insure that all power is locked off in accordance with your company's lockout/tagout policy. Be sure that all movable members (*such as rolls, arms, tables, etc.*) are securely blocked from inadvertent motion which might be hazardous. Treat all electrical lines as being live and all piping as being under high pressure. Insure that all items are properly reassembled before placing them into operation. *Before equipment is returned to service, ALL safe guards or devices MUST BE in place and properly adjusted.*

## **⚠️ NOTICE**

Before doing any WELDING ON EQUIPMENT, the following precautions must be taken to insure against damage:

- 1) All power is removed from system.
- 2) The weld ground is connected to the closest possible location on the unit where the welding is being performed.
- 3) All encoders, sense eyes, and controls should be electronically disconnected if at all possible to avoid possible damage.

### **Operation**

This equipment is capable of speeds, tensions, and adjustments which may be hazardous for some of the materials within the line specification. For example, thin, narrow strip may be subjected to tensions sufficient to cause breakage. Never attempt to process any material unless the safe adjustments for that particular are known and can be implemented.

### **Traffic Around Equipment**

Care should be taken at all times in moving around the equipment, whether on foot or in a vehicle. Changes in floor elevation, machine bases and debris around the equipment are trip hazards. Take care that personnel are not trapped between vehicles and equipment.

## **⚠️ DANGER**

**Do not attempt to walk or climb on any machine while in operation. Failure to observe this warning may result in death or serious injury.**

### **HAZARD REMINDER**

Use the following HAZARD REMINDER sheet to reinforce awareness of the hazards associated with coil processing lines. This reminder can be a useful supplement to your company's safety program. *ENGEL suggests the following steps:*

1. SHOW each individual the HAZARD REMINDER sheet and explain each category of hazard.

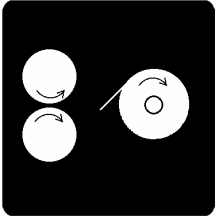
2. POINT OUT EXAMPLES of each type of hazard on the actual equipment the individual operates or works around.
3. EXPLAIN HOW TO AVOID HAZARDS in the individuals work environment.
4. GIVE a copy of the HAZARD REMINDER sheet to each individual.

***Safety is everyone's business!***

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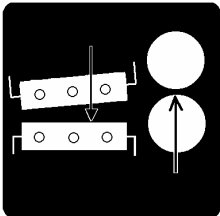
THINK

# SAFETY FIRST



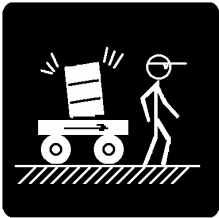
## NIP POINT

WHEN ONE OBJECT ROTATES NEAR ANOTHER, IT CAN PULL YOU IN *and* CRUSH YOU



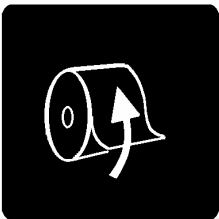
## PINCH POINT

WHEN ONE OBJECT MOVES CLOSER TO ANOTHER, IT CAN CUT *or* PINCH YOU.



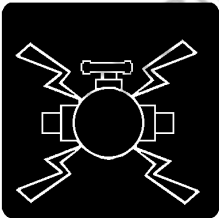
## MOVING EQUIPMENT *and* COILS

CAN KNOCK YOU OFF BALANCE *or* CRUSH YOU



## STRIP EDGES *and* ENDS

CAN CUT *or* STRIKE YOU.



## ELECTRICAL *and* FLUID SYSTEMS

CAN SHOCK *and* BURN YOU *and* CAN EXPLODE.



## CLIMBING ON MACHINES

CAN MAKE YOU FALL - MAYBE INTO ONE OF THE HAZARDS ABOVE.

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## LOCKOUT GUIDE

### 1. LOCKOUT GUIDE

#### A. INTRODUCTION

An essential element of a comprehensive safety program includes the development and use of a written hazardous energy lockout procedure. The lockout procedure establishes the minimum requirements for the lockout of hazardous energy sources using an energy-isolating device whenever maintenance or service is performed on the processing line. The goal of this section is to outline a sample procedure that can be used as a guide when developing your own written procedures for complying with the requirements of O.S.H.A. 29 CFR 1910.147.

#### B. SCOPE

This procedure applies to all work on the processing line other than normal operational tasks. "Normal operational tasks" are tasks that:

- Do not require the employee to place any part of his body in a danger zone or point of operation.
- Do not require safety guards or safety devices to be removed or defeated.
- Do not expose the employee to hazards associated with the unexpected energization, start-up, or release of stored energy.

This procedure shall be used to ensure that the machine is stopped and isolated from all potentially hazardous energy sources and that these energy sources are locked out before employees perform any servicing or maintenance when the unexpected energization, start-up of the machine, or the release of stored energy could cause injury.

This procedure does not apply to minor tool changes and adjustments and other minor servicing activities that take place during normal production operations.

#### C. DEFINITIONS

##### (1) Affected Employee

Any employee who is performing service or maintenance on equipment or whose job requires the individual to work in an area in which servicing or maintenance is being performed.

##### (2) Authorized Employee

A person who locks or tags out machines or equipment in order to perform service or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing service or maintenance covered under this section.

##### (3) Energy-Isolating Device

An apparatus that isolates hazardous energy. The apparatus must be capable of accepting a lock and tag when equipment is being repaired or maintained.

#### (4) Lockout

The placement of a lockout device on an energy-isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

#### (5) Tagout

The placement of a tagout device on an energy isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

### CAUTION

**Use of a tag in place of a lock does not adequately guard against accidental operation.**

#### (6) Servicing and/or maintenance

Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming of machines or equipment and making adjustments or tool changes where the employee may be exposed to the unexpected energization or start-up of the equipment or the release of hazardous energy.

### D. RESPONSIBILITIES

Department managers shall ensure compliance with the lockout/tagout procedure, provide training, and provide required materials as needed for compliance.

#### (1) Department Supervisors shall:

- Develop lockout procedures for all equipment and keep documentation of the methods on file.
- Provide specific lockout method training to employees before allowing authorized employees to perform service or maintenance work.
- Assure that lockout procedures are audited on a regular basis and corrective actions taken and documented when necessary.

#### (2) Maintenance Manager shall:

- Maintain a supply of locks, multiple lockout devices, plug locks, breaker locks, and any other devices needed to lock out machines or equipment.
- Maintain a supply of informational lockout warning tags.
- Notify the appropriate manager or department when energy isolation instructions or instructional signs need to be made or changed.
- Audit maintenance employee use of lockout procedures periodically, take corrective actions as required, and document all corrective actions taken.

#### (3) Manufacturing Engineers shall:

- Assure that new equipment, rebuilt equipment, and equipment being renovated or upgraded has energy-isolating devices that are capable of being locked out before being installed or put back into service.
- Maintain a list of all plant equipment.

- Contact Safety Manager for review of new equipment prior to releasing the equipment to production.

**(4) Affected employees shall:**

- Notify one of the following departments for an authorized employee lockout whenever servicing or maintenance is needed:

Maintenance

Die Setters

Press Operators

Engineers and Technicians

- Never interfere with equipment that is locked out, remove a lock, or attempt to operate locked out equipment.

**(5) Safety Manager shall:**

- Develop and upgrade this policy as needed.
- Audit the lockout program at least annually.
- Assist in training.

**E. PROCEDURES**

**(1) Lock System**

- Locks to be used for lockout will be red, key operated padlocks and will be supplied to authorized employees using the current tool policy.
- One lock and one key will be issued to each authorized employee, unless an individual requires more than one lock on a regular basis.
- Each lock will be identified by the employee name and clock number engraved on the lock. Locks may not be loaned to other employees.
- Department locks used for group lockout or when extra locks are needed for a specific situation will be numbered by department and kept in the department office or an area lock bank. When locks from the bank are in use, tags will be left in the bank indicating date, where used, authorized employee name and id number.
- Locks may be used for lockout only. Red locks may not be used on lockers or tool boxes at any time.
- Only one key will be issued per lock. All duplicates will be destroyed, and no master keys will be kept.

**(2) Sequence of Lockout**

- Notify all affected employees that servicing or maintenance is required and that the machine or equipment must be shut down and locked out.
- Refer to the written lockout procedure for the equipment to determine the types and magnitude of the energy sources involved, understand the hazards of that energy, and the methods of control.

- Shut the machine down using normal operating means (stop button). Operate (shut off, close, block, etc.) all of the energy-isolating devices. Lock out the energy-isolating devices with the assigned red padlock(s). Mechanical power presses will have the lockout procedures posted in a binder in each department supervisor's office, listed by asset number. Other equipment having multiple energy sources will have the lockout procedure posted on the equipment.

## NOTICE

If more than one person is working on a machine, each individual must attach his own lock to the energy-isolating device.

- Verify, by operating the normal starting means or using test equipment, that the lockout has accomplished zero mechanical state. Return controls to off.

### (3) Restoring Equipment to Normal Operation

- Remove tools, install guards, and notify affected employees, ensuring that they understand and are in the clear.
- Verify that the operating controls are in the off or neutral position.
- Remove lockout devices and reenergize the machine.
- Notify affected employees that the machine is ready for use.

### (4) Special Situations

Group Lockout is used when more than one employee must work on a machine at the same time. One of the following must be used:

- Each employee shall place his lock on the energy isolating device(s).
- A multiple lock device (hasp) may be used if the energy-isolating device cannot accept multiple locks.
- When multiple locks cannot be used, lockout can be accomplished by:
  - ✓ An authorized employee may lockout (including all necessary steps) energy-isolating device(s) using identified departmental locks.
  - ✓ The key to the identified departmental locks will then be placed into an identified lock box.
  - ✓ All personnel associated with the lockout will then secure the identified lock box with their personal locks.
  - ✓ As each individual completes his task, he will remove his lock from the lock
  - ✓ When all locks have been removed from the lock box, the authorized employee who made the original lockout may remove the locks from the energy isolating devices, following all steps in restoring a machine to service.

Shift Changes must maintain continuity of lockout and the safety of incoming employees using the following procedure.

- The lock(s) of the authorized employee(s) of the first crew will be replaced with identified departmental locks.
- The departmental lock keys will then be given to the supervisor, who will supply them to the incoming crew.



- The incoming crew will then verify lockout using all procedures before replacing the departmental locks with their own or using lock box procedures.

Contractors working in the company plant must have lockout procedures that meet or exceed the standard.

- Prior to beginning work, each contractor must supply the company with the written lockout procedures to be used.
- The contractor's procedure will be reviewed by the Safety Manager and the contractor will be approved or rejected.
- If approved, the contractor's procedure and the company procedure will be reviewed in a joint meeting so that each party is aware of the other's procedure.
- Under no circumstances will the company provide a contractor with locks or advice on lockout procedures, other than assistance with identifying energy sources and energy isolating devices.

Lock removal by other than the owner of the lock may only be done if all of the following conditions are met.

- The supervisor must verify that the authorized employee who placed the lock is not in the facility.
- The supervisor must make a reasonable effort to contact the employee to verify the condition/situation with the equipment and to inform the employee that his lock is going to be removed.
- The supervisor must insure that the person knows his lock has been removed prior to resuming work in the facility.
- The supervisor completes the Safety Lock Removal Incident form. This form must be reviewed with the appropriate department manager and the Safety Manager.

## F. TRAINING

The following *sample* outline may be used as a guide when developing a lockout/tagout training program for your company's employees.

### (1) Authorized Employees must be trained in the following:

- Recognition of applicable hazardous energy sources.
- The type and magnitude of the energy available in the workplace.
- The methods and means necessary for energy isolation and control.

### (2) Affected Employees must be trained in the following:

- The purpose and use of the energy control procedure.
- The prohibition and dangers of related to attempts to start or reenergize machines that are locked out.

### (3) Retraining

Retraining will be provided for authorized and affected employees whenever one of the following occurs. The retraining should reestablish employee proficiency or introduce new methods and procedures as needed.

- There is a change in their job assignments.
- There is a change in equipment, machines, or processes that present a new hazard.
- There is a change in energy control procedures.
- Periodic inspection reveals or there is reason to believe that there are deviations from this policy caused by inadequate knowledge of the procedure.

## NOTICE

Deviations from this policy due to negligence on the part of the employee must be dealt with by the established corrective action policy.

### (4) Training

- Training must be certified, including the date and time of training and each Records will be filed by the Safety Manager.
- Training will follow the Lockout Program Training Outline.

## G. TRAINING OUTLINE

### (1) Why lockout?

1. To prevent injury from the accidental start-up or release of energy while performing maintenance or testing.
2. To comply with O.S.H.A. 1910.147.
3. It is the RIGHT thing to do.

### (2) What are sources of energy?

- Thermal
- Pneumatic (*air*)
- Gravity
- Hydraulic
- Electrical
- Mechanical

### (3) Sequence for lockout:

1. Notify all affected employees.
2. Shut down equipment by normal methods.
3. Operate controls/dissipate energy (*return controls!*)
4. Lockout energy isolation devices
5. Verify lockout.

### (4) Lock system:

1. Locks are RED key operated locks.
2. ONE lock, ONE key issued to authorized employees (*additional locks, individually keyed may be required for some authorized employees*).
3. EACH lock (*with one key*) will be identified by employee name and clock number.

4. Department locks will be numbered and identified by department and kept in:
  - The department office in a lock bank.
  - In the area on a lock bank.
  - In a cabinet.
5. Locks will be purchased by departments (*by Managers ONLY*).
6. Lock replacement policy - use existing tool policy.
7. Locks must be in the care of the personnel to whom they are assigned whenever on duty.
8. Identification tags will be placed in the lock bank when locks are in use indicating:
  - Date.
  - Equipment where used.
  - Authorized employee name.
  - Authorized employee ID number.

**(5) The lock:**

1. Must be readily identifiable as a lockout lock.
2. Can be used for lockout ONLY.
3. Can have only ONE key for each lock.
4. Can NOT have a “master key”.
5. Must be individually identified.
6. Personal lockout locks CANNOT be lent or borrowed.
7. MUST be used.

**(6) When is lockout not required?**

Lockout is not required for minor tool changes and adjustments and other minor servicing activities which take place during normal production operations.

This is ONLY applicable if they are ROUTINE, REPETITIVE and INTEGRAL to the use of the equipment for production, provided that the work is performed using alternative measures which provide effective protection.

**(7) When do we lockout?**

1. A machine or line which is OPERABLE FOR PRODUCTION can be SERVICED, ADJUSTED, and/or TESTED without lockout if:
  - The person is NOT required to place any part of his/her body in jeopardy

**and**

  - The person is NOT working where a safety guard is removed or a safety device is defeated.

**and**

- The person is not exposed to unexpected energization, start-up or release of stored energy.
- 2. When servicing, testing, and maintaining equipment in which:
  - The unexpected energization of machines or equipment COULD CAUSE INJURY OR DEATH.
  - or
  - The unexpected start-up of machines or equipment COULD CAUSE INJURY OR DEATH.
  - or
  - The release of stored energy COULD CAUSE INJURY OR DEATH.

## **(8) What about contractors?**

Each contractor working on projects in the plant must have lockout procedures that meet or exceed the standard.

Prior to beginning work, the responsible representative of the contractor and will meet with the company contact to review the lockout procedures of the contractor and the company.

The company contact or project coordinator shall review the contractor's lockout procedure with any company personnel who will be involved with the project.

## **(9) Unfamiliar with lockout?**

When a service or technical group must inspect or perform work on an unfamiliar operational unit, an operations or maintenance supervisor familiar with the unit shall be on site and will actively participate in the lockout. The operations or maintenance supervisor duties include the verification of zero mechanical state and active participation in the lockout removal procedure.

## **(10) How do I know where to put my lock(s) for lockout?**

1. Refer to the Equipment Lockout Survey (developed by the Safety Committee or Safety Manager) which identifies lockout points for each machine.
2. If not sure, contact knowledgeable operations or maintenance supervisor who will actively participate in the lockout, including verification of zero mechanical state and active participation in lockout removal procedure.
3. VERIFY LOCKOUT BEFORE BEGINNING WORK.

## **(11) Verify lockout - how?**

- Testers
- Operate Controls

## **(12) Group lockout**

1. Each person shall place their lock(s) on the appropriate energy isolating device(s).
2. A multiple lock device (hasp) may be used, if the energy isolating device cannot accept multiple locks.
3. When multiple locks are not used, lockout can be accomplished by:
  - An authorized person may lockout (including all necessary steps) energy isolation device(s) using an identified departmental lock(s).

- The key to that identified departmental lock(s) will then be placed into an identified lock box.
- All personnel associated with the lockout will then secure the identified lock box with their personal locks.

### **(13) Department lock banks**

All departments will maintain a “lock bank”. A lock bank is a storage area for identified departmental locks. Authorized personnel may “borrow” identified lockout lock(s) by recording the following information:

1. The identification number of the “borrowed” lockout lock(s).
2. The name of the authorized person who is “borrowing” the lockout lock.
3. The date the lockout lock(s) were “borrowed”.
4. Where the “borrowed” lockout lock(s) are being used.

### **(14) Restoring machines/equipment to normal operation.**

1. Check area around machine/equipment.
2. Remove tools, install guards, notify affected employees, verify affected employees understand change of status, and verify they are clear of equipment.
3. Verify that Operating controls are in the de-energized (OFF) position.
4. Start-up of machine/equipment may then be accomplished.

### **(15) What about shift changes?**

To ensure the continuity of lockout during shift changes:

1. The lock(s) of the authorized employee(s) of the first crew shall be replaced with identified departmental lock(s) from the “Lock Bank”.
2. The identified departmental lock key(s) will then be supplied by the Supervisor to the authorized employee(s) of the second crew.
3. The authorized employee(s) of the second crew will then replace the identified departmental lock(s) on the controlling device(s) or will use lock box procedures.

### **(16) Removing locks**

1. Can ONLY be done by the person who place their personal lock(s) on the device.
2. When the person cannot remove the lock, the lock can be removed under the following circumstances:
  - Supervisor or leader verifies that the authorized person who applied the lock to the device(s) is not at the facility.
  - Supervisor or leader must take all reasonable efforts to contact the authorized person (informing them that the lock is going to be removed).
  - Supervisor or leader ensures that the authorized person has this knowledge BEFORE they resume work at the facility.
  - A REMOVAL FORM must be filled out. The Supervisor and Manager must review the form with the Safety Manager and Plant Manager.

## (17) Retraining

1. When there is a change in job assignment, machines, equipment, or processes that present a new hazard or there is a change in the energy control procedure.
2. Shall re-establish employee proficiency and introduce new or revised control methods and procedures as necessary.
3. The company shall certify that employee training has been accomplished and is kept up-to-date.
4. Certification.

CINCINNATI PRECISION MACHINERY 513-860-4133

## 800 Rollformer Series

### 1. INTRODUCTION

The Engel 800 Series Rollformers offers a wide variety of tooling configurations with the highest of quality and reliability expected from Engel Industries. Eight forming stations are used to achieve the desired profiles which ride on 1" ground and polished spindles. Oversized bearing with inner races are used on each station and hardened steel guides are used to handle rough plasma edges.

The 800 Series Rollformer is equipped with a 5 HP motor with a variety of voltages available. Line speed is set at 90 FPM and the entire unit is backed up with Engel's one year factory warranty.



Figure 1-1 Engel 800 Series Rollformer





## A. INSTALLATION

In selecting a location for the line, consider these factors:

- Working weight in relation to the building structure for proper support.
- Access to the selected location where the machine will be installed.
- An adequate area to allow sufficient working space around the machine (a clearance of at least 3 feet or 914 mm) for proper ventilation and maintenance.

Some thought should also be given to availability of the required power source (refer to the electrical drawing shipped with the machine or in the back of the manual). The machine should also be located away from grinding machines, sanding machines, spray painting areas and other sources of contamination if practical.

Answers to questions regarding site preparation and other technical assistance is available free of charge via telephone between the hours of 8 AM and 4:30 PM CST Monday through Friday by calling the Engel Customer Service Department at 314-638-0100.

### (1) Unpacking The Machine

When the machine arrives, inspect it carefully before accepting the shipment. It is important to note any damage on the Bill of Lading or other shipping documents so that a claim can be filed with the carrier.

Pay special attention to the control console, because it contains delicate electronic devices. Check for physical damage to the switches and the components inside. If anything looks damaged, notify both the carrier (to file a claim) and our Customer Service Department (to order replacement parts). It is important to notify the factory promptly so the new parts arrive before the machine is installed, as it may not be possible to start up and run the machine without them.

Normal procedures should be used to unpack the machine. Remove any covering, steel strapping or skids that may be present. Remove all wooden blocks (used as spacers to prevent movement of the machine parts during shipment). After inspection and unpacking, prepare to move the machine into position, using the floor layout drawing in the back of this manual. This can be done with a fork truck or overhead crane. Once the equipment is in position make the necessary electrical connections. Then bring in the required power source to the control console. When doing the electrical hookups, refer to the electrical drawings supplied with the equipment if necessary.

To safely operate this machinery, all personal must read and understand the safety section of this manual. Study and follow the safety precautions in this section, which are intended to prevent injury to you and your fellow workers. However, they cannot cover all possible situations. Therefore, consider the consequences of your actions before executing any procedure or operation.

## B. SAFETY

### (1) Safety Precautions (Before Starting The Machine)

- Protect yourself. Wear safety glasses and leather gloves while handling the material. Do not wear loose clothing, neckties, or jewelry. If long sleeves must be worn, avoid cuffs and buttons.
- Keep your work area clean. Remove all scrap, oil spills, rags, tools, and any other loose items that could cause you to slip, trip, or fall.
- Make sure that hydraulic pressures are at specified levels before operating the machine.





- Be alert for loose, worn, or broken parts. Do not attempt to operate the machine with such parts present, or if the machine is making unusual noises or actions.
- Be sure that this manual is kept near the machine so the operator can refer to it when necessary. If you have not already done so, study the manual before operating the machine.
- Be aware of the location of the POWER OFF push-button as well as the Emergency Stop push-button and use them to stop the machine in emergencies.

## **(2) Safety Precautions (While Operating The Machine)**

- Be alert when operating the machine.
- Only one person should control the machine. Never allow anyone to operate the controls while you are working on the machine.
- Remove all Power and tag and lock it out any time someone is working on or repairing the machine.
- Keep your arms and hands away from the internal workings of the machine when starting, running, or stopping the machine.
- Never leave the work area while the machine is running.
- Use good quality metal coils free of damaged or mashed ends.
- Continually observe the punching, shearing, and rollforming of the metal and monitor the machine. If any unusual condition develops, immediately stop the machine and investigate.
- Do not work on any moving device without first powering down the machine and taking every safety precaution.
- When cleaning the machine, or any components, do not use toxic or flammable substances. Do not perform any cleaning while the machine is running. Never override or disable any safety switch or safety interlock.
- Use proper size wrenches and tools. Do not use adjustable crescent wrenches or worn wrenches. A slipping wrench can cause a serious injury. Replace worn nuts, bolts, screws, etc., being sure they are of equivalent quality of those being replaced.
- Use caution when using an air hose to clean in and around the machine. Air pressure may drive dirt and small chips into bearing surfaces or cause bodily injury.



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## 2. SYSTEM OVERVIEW

### A. ROLLFORMER

The Engel 800 Series Rollformer utilizes 8 forming stations to produce the desired profiles. It is powered by a 5 HP motor, with a production rate of approximately 90 feet per minute.

The forming rolls were factory pre-gapped and should require little or no adjustment. The pre-gap settings allow the production of various gauges, without resetting any roll gap.



Figure 2-1 Rollformer Assembly

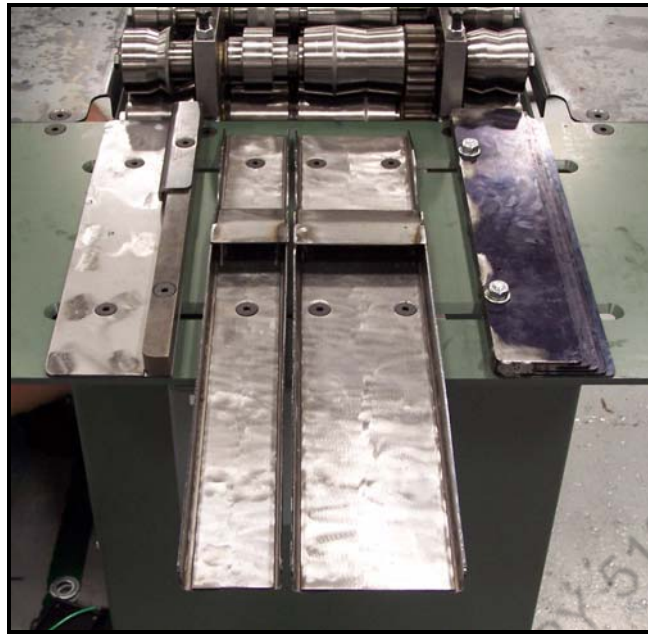
#### (1) Entrance Guides

Located at the entrance end of the rollformer are entrance guides which are used to support the material as it enters the first set of forming rolls. The entrance guides also determine the final profile depending upon which set of tooling is forming the part.

These guides were factory set and should require little or no adjustment.

#### **⚠ DANGER:**

**NEVER perform maintenance or make any adjustments without removing power from any power source and locking out that source. SAFETY IS ALWAYS FIRST!!!!!!**

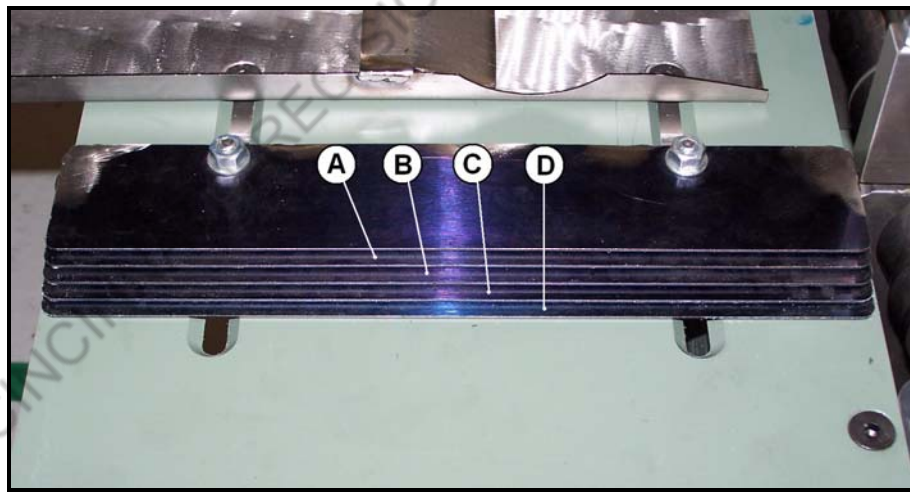


**Figure 2-2 Typical Entrance Guides (HB-825S Shown)**

**(2) Triplex Outboard Feed Guide Option**

If your 800 Series is equipped with Triplex outboard tooling, it will come with a multi-position entrance feed guide. This guide allows a variety of profiles to be formed without manually repositioning the entrance feed guides.

A chart is provided to assist the operator in determining which slot is used for each profile.



**Figure 2-3 Triplex Entrance Feed Guide**

Profile	Slot Used
Right Angle ¼" leg	A
Right Angle ½" leg	B
Standing Seam	C
Triplex	D

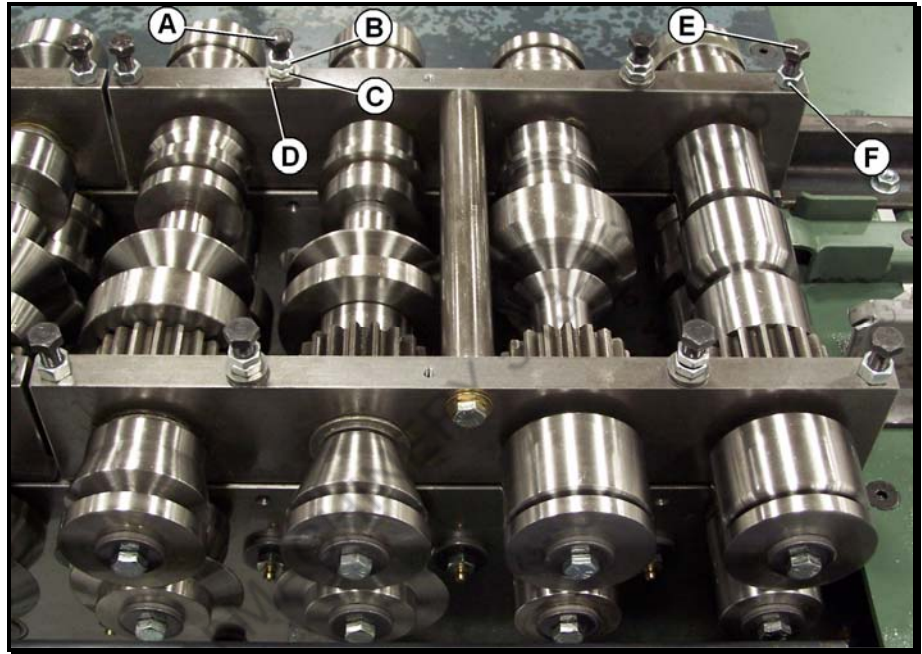
### (3) Factory Roll Gap Settings

The forming rolls were factory pre-gapped and should require little or no adjustment. The pre-gap settings allow the production of various gauges, without resetting roll gap.

All 8 stations are factory gapped. Each set of four forming stations is equipped with four Tensioning Assemblies (Items **A-D**) and four Roll Gapping Assemblies (Items **E** and **F**).

*All four of each type of assembly must be adjusted during this procedure.*

<b>A</b>	Tension Bolt
<b>B</b>	Locking Jam Nut
<b>C</b>	Adjusting Jam Nut
<b>D</b>	Tension Spring Washers
<b>E</b>	Roll Gap Adjustment Bolt
<b>F</b>	Jam Nut



**Figure 2-4 Roll Gap Adjustment Components**

#### (a) Resetting Roll Gap & Tension

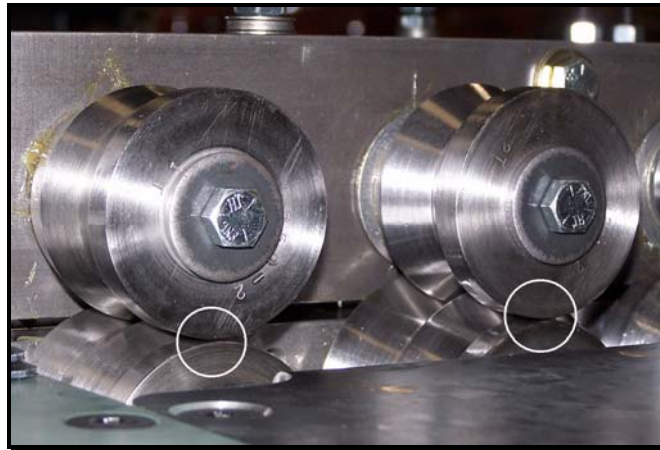
The following is the recommended procedure for resetting the forming rolls to factory specifications.

1. Ensure ALL power sources are shutoff and locked out.

**⚠ DANGER:**  
**NEVER perform maintenance or make any adjustments without removing power from any power source and locking out that source. SAFETY IS ALWAYS FIRST!!!!!!**

2. Remove the top cover.
3. Loosen the Jam Nut (**F**) on each Roll Gapping Assemblies.
4. Turn each Roll Gap Adjustment Bolt (**E**) counter clockwise on each Tensioning Assembly until the forming rolls are seated on top of each other.
5. With a feeler gauge, raise the forming rolls slowly with the Roll Gap Adjustment Bolts (Item **E**), until the desired gap is obtained.

**⚠ NOTE:**  
 Each set of four forming rolls are contained by a single side plate, so adjusting the first roll and the last roll in each set of side plate is all that is required. The second and third roll gaps will be set once the first and fourth are set.



**Figure 2-5 Roll Gap Locations**

6. This may take several adjustments to achieve the desired results.
7. Once the adjustment has been made retighten all Jam Nuts (**F**) on each Tensioning Assembly and then confirm proper gap.
8. Loosen Locking Jam Nut (**B**) on each Tensioning Assembly.
9. Turn Adjusting Jam Nut (**C**) clockwise until snug on each Tensioning Assembly.
10. Now, turn Adjusting Jam Nut (**C**) counter clockwise three flats on the nut on each Tensioning Assembly, which sets the proper tension on the forming rolls.
11. Retighten all Locking Jam Nuts (**B**).

**(4) Roll Gap Chart**

This chart is used for reference only.

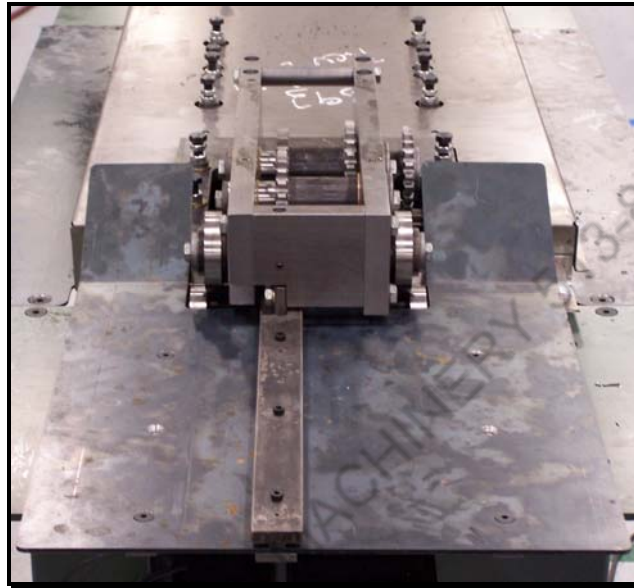
Roll Set	HB-800	HB-825 W/Slitter	Clearance Settings
MR-AL-16	X	X	.035
MR-AL-20	X	X	.010
MR-DC-20	X	X	#1-.010, #4-.015, #5-.015, #8-.035
MR-FB-18	X	X	.025
MR-FB-20	X	X	.010
MR-FB-24	X	X	.010
MR-MB-20	X	X	.010
MR-MB-24	X	X	.010
MR-PL-16-HB	X	X	.035
MR-PL-18-HB	X	X	.015
MR-PL-18-3/8	X	X	.015
MR-PL-20	X	X	.010
MR-RA-18	X	X	.015
MR-RA-20	X	X	.010
MR-S	X	X	Determined by outboard tooling
MR-T31-22	X	X	.015



**(5) Slitter Attachment** *(Option)*

The 800 series can also be equipped with an optional slitter attachment. The slitter allows what used to be scrap material to be formed into Drive or S cleats. This unit is mounted to the top of the 800 series with a chute located between the slitter knives and the first set of forming rolls. This allows the strip to go from the slitter directly into the forming rolls, which reduces material handling.

The maximum capacity for Drive Cleats is 20 GA and the maximum for S Cleats is 22 GA. The minimum capacity for either cleats is 26 GA galvanized steel.



**Figure 2-6 Slitter Attachment**

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### 3. SYSTEM CONTROLS

This section describes the operational controls for the rollformer. The only control of the Engel 800 Series is a single On/Off rocker switch. This switch is used to start and stop the forming rolls drive motor.

#### (1) ROLLFORMER START/STOP SWITCH

A rocker style switch is used to start and stop the rollformer drive motor. To utilize this switch, the Rollformer must be connected to a proper electrical connection.



Figure 3-1 Start/Stop Switch



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#### 4. MAINTENANCE

##### A. TORQUE VALUES FOR GENERAL ASSEMBLY

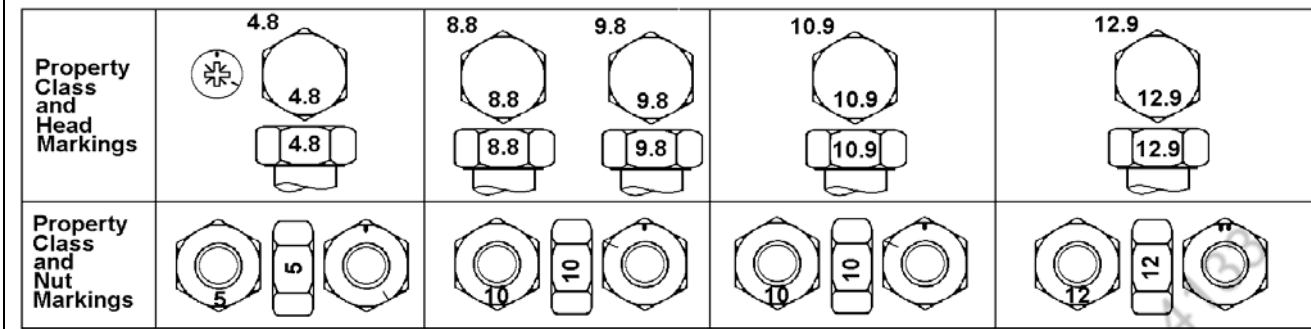
The torque chart value (*Table 1 and 2*) is provided for reference when performing general assembly of various components. These values should be used only if torque values are not otherwise specified for a particular assembly. Refer to the associated assembly drawings for assemblies or other component assemblies that may require special torque specifications.

The following conditions must be observed when using the general assembly torque values:

- Joints are assumed to be metal and rigid. Do use these values where gaskets or compressed material may be damaged by over-torquing.
- During disassembly, note bolt head markings and always reassemble the same hardware or equivalent new hardware in the correct locations.
- As a general rule, when reusing previously removed hardware, apply the minimum values from the table.
- Reduce the table values by 20% when assembling plated hardware or phosphate coated hardware.
- Reduce table values by 30% when molykote, white lead, or similar mixtures are used to lubricate threads.
- Reduce the table values by 35% when torquing jam nut (*thin nuts*).
- Special use column values in the table are for capscrews in gray iron castings when thread length engagement is at least 1.5 times the capscrew diameter.

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**Table 4-1. Metric Bolt And Cap Screw Torque Values**



size	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Lubricated*		Dry*		Lubricated*		Dry*		Lubricated*		Dry*		Lubricated*		Dry*	
	N-m	Lb-ft	N-m	Lb-ft	N-m	Lb-ft	N-m	Lb-ft	N-m	Lb-ft	N-m	Lb-ft	N-m	Lb-ft	N-m	Lb-ft
M6	4.8	3.5	6	4.5	9	6.5	11	8.5	13	9.5	17	12	15	11.5	19	14.5
M8	12	8.5	15	11	22	16	28	20	32	24	40	30	37	28	47	35
M10	23	17	29	21	43	32	55	40	63	47	80	60	75	55	95	70
M12	40	29	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	47	80	60	120	88	150	110	175	130	225	165	205	150	260	190
M16	100	73	125	92	190	140	240	175	275	200	350	225	320	240	400	300
M18	135	100	175	125	260	195	330	250	375	275	475	350	440	325	560	410
M20	190	140	240	180	375	275	475	350	530	400	675	500	625	460	800	580
M22	260	190	330	250	510	375	650	475	725	540	925	675	850	625	1075	800
M24	330	250	425	310	650	475	825	600	925	675	1150	850	1075	800	1350	1000
M27	490	360	625	450	950	700	1200	875	1350	1000	1700	1250	1600	1150	2000	1500
M30	675	490	850	625	1300	950	1650	1200	1850	1350	2300	1700	2150	1600	2700	2000
M33	900	675	1150	850	1750	1300	220	1650	2500	1850	3150	2350	2900	2150	3700	2750
M36	1150	850	1450	1075	2250	1650	2850	2100	3200	2350	4050	3000	3750	2750	4750	3500

DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical property class.

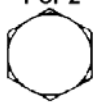
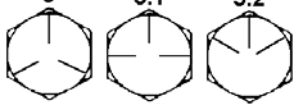
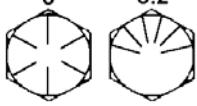
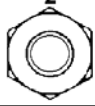
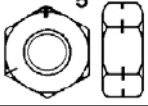

Fasteners should be replaced with the same or higher property class. If higher property class fasteners are used, these should only be tightened to the strength of the original.

\* "Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated without any lubrication.

Make sure fasteners threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head. Tighten toothed or serrated-type lock nuts to the full torque value.

**Table 4-2. Unified Inch Bolt And Cap Screw Torque Values**

<b>SAE Grade and Head Markings</b>	NO MARK 		
<b>SAE Grade and Nut Markings</b>	NO MARK 		

size	Grade 1				Grade 2 <sup>b</sup>				Grade 5, 5.1, or 5.2				Grade 8 or 8.2			
	Lubricated*		Dry*		Lubricated*		Dry*		Lubricated*		Dry*		Lubricated*		Dry*	
	N-m	Lb-ft	N-m	Lb-ft	N-m	Lb-ft	N-m	Lb-ft	N-m	Lb-ft	N-m	Lb-ft	N-m	Lb-ft	N-m	Lb-ft
1/4	3.7	2.8	4.7	3.5	6	4.5	7.5	5.5	9.5	7	12	9	13.5	10	17	12.5
5/16	7.7	5.5	10	7	12	9	15	11	20	15	25	18	28	21	35	26
3/8	14	10	17	13	22	16	27	20	35	26	44	33	50	36	63	46
7/16	22	16	28	20	35	26	44	32	55	41	70	52	80	58	100	75
1/2	33	25	42	31	53	39	67	50	85	63	110	80	120	90	150	115
9/16	48	36	60	45	75	56	95	70	125	90	155	115	175	130	225	160
5/8	67	50	85	62	105	78	135	100	170	125	215	160	215	160	300	225
3/4	120	87	150	110	190	140	240	175	300	225	375	280	425	310	550	400
7/8	190	140	240	175	190	140	240	175	490	360	625	450	700	500	875	650
1	290	210	360	270	290	210	360	270	725	540	925	675	1050	750	1300	975
1-1/8	470	300	510	375	470	300	510	375	900	675	1150	850	1450	1075	1850	1350
1-1/4	570	425	725	530	570	425	725	530	1300	950	1650	1200	2050	1500	2600	1950
1-3/8	750	550	950	700	750	550	950	700	1700	1250	2150	1550	2700	2000	3400	2550
1-1/2	1000	725	1250	925	990	725	1250	930	2250	1650	2850	2100	3600	2650	4550	3350

DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical property class.

Fasteners should be replaced with the same or higher property class. If higher property class fasteners are used, these should only be tightened to the strength of the original.

\* "Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated without any lubrication.

Make sure fasteners threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head. Tighten toothed or serrated-type lock nuts to the full torque value.

<sup>b</sup> Grade 2 applies for hex cap screws (not hex bolts) up to 152mm (6 in.) long. Grade 1 applies to hex cap screws over 152 mm (6 in.) long, and for all other types of bolts and screws of any length.

**B. SERVICING**

**(1) Lubricant Recommendations / Specifications**

To ensure that the system is kept in a correct operating condition, it must be inspected and maintained on a regular basis. Proper cleaning and/or replacement of filters, the periodic lubrication of bearings, bushings, chains and other moving friction and wear generating points will prevent damage to or failure of the unit, and provide optimum performance.

Table 4-3 lists the types of lubricants used to maintain the equipment. The **LUBE TYPE** code on the left side of the table is utilized to identify the lubricant used in the text of this manual.

**Table 4-3. Recommended Lubrication Products**

Lube Type	Description	Recommended Products
<b>A</b>	CHAIN OIL	<b>WAY LUBRICANT 220</b>
<b>B</b>	MULTI-PURPOSE LUBE	<b>LUBRIKO M6</b> MARFAX MULTI-PURPOSE #2 (TEXACO) MULTI-PURPOSE #2 GREASE (AMACO) MOBILITH AW #2 (MOBIL)
<b>C</b>	GEARBOX OIL	<b>SYNTHETIC OIL 634 (MOBILE)</b> VAN GUARD CYLINDER OIL 680 (TEXACO) CYLINDER OIL 680 (AMACO)
<b>D</b>	HYDRAULIC OIL	<b>DTE #25 MOBILE (NON-HYPOID)</b> RANDO HYD AW46 HYDRAULIC OIL (TEXACO) AW-68 HYDRAULIC OIL (AMACO)
<b>E</b>	GEAR GREASE	<b>ENLUBE S-CHEM 10M-2</b>

**(2) Lubrication, General Requirements**

Table 4-5 shows some of the lubrication points on the system. The maintenance technician must become familiar with all the lubrication points located throughout the line. Chain drives, rack and pinion locations, dies, rollers, hand wheels, and those points where metal-to-metal contact of movable surfaces are located must be adequately lubricated. The lubrication schedule shown in Table 4 was developed as a "general" application. The actual lubrication requirements for the line and for individual points will be determined by usage requirements. These requirements will be based on line setup, usage, and equipment environment.

During lubrication procedures, a preventative maintenance inspection should also be conducted. Check the machine visually for loose nuts, bolts, parts out of adjustment, etc. Correct all deficiencies while they are small, and before they become operational problems.

Certain parts of the machine are left unpainted to aid in the movement of the slide assembly when changing dies, etc. Keep these areas clean and coated with light grease.

**(3) Lubrication Schedule**

The lubrication schedule shown in Table 4-4 was developed as a "general" application. The actual lubrication requirements for the line and for individual points will be determined by usage requirements. These requirements will be based on line setup, usage, and equipment environment.

1. Do not over-lubricate.

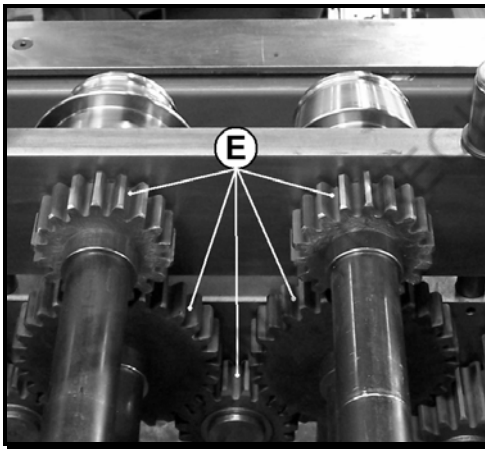
2. When using a low pressure grease gun, lubricate only to the point of grease starting to come out of the edges of the seals, etc., of the item being lubricated.
3. Do not over lubricate chains. Chain drives should not be lubricated to the point that oil is "flung" off during operation.
4. Ensure that proximity sensor heads are kept clean and free of lubricant. Dirty sensor heads will affect system operation.
5. NOT ALL lubrication points are shown in "System Lubrication Points" photos, ensure ALL points are identified and properly lubricated.

**Table 4-4. Lubrication Schedule**

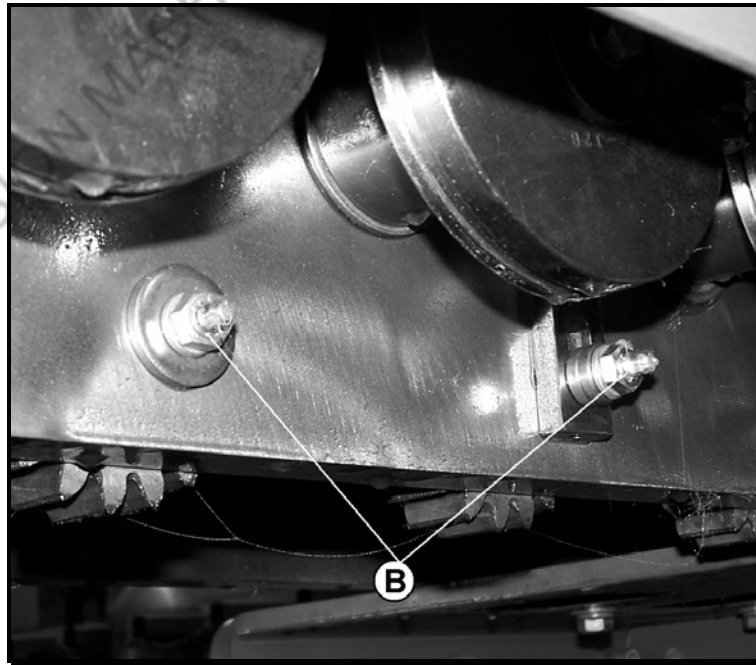
Procedure	Lube Type	Weekly	Monthly	6 Months	12 Months
<b>ROLLFORMER</b>					
Shaft Support Bearings	B			X	
Gears	E		X		
Roll Bearings	B			X	

**Table 4-5. System Lubrication Points**

**ROLLFORMER**



**ALL Gear Surfaces**



**Roll Bearings**

**⚠ NOTICE**

**NOT ALL lubrication points are shown in "System Lubrication Points" photos, ensure ALL points are identified and properly lubricated**



### C. TOOLING REPLACEMENT

To order replacement tooling for your specific rollformer, remove the roll(s) and contact the Engel Service Department. The Engel representative will need the number stamped on the face of the roll(s) to ensure the correct replacements are ordered and shipped.

The Engel Service phone number is (314)-638-0100 and the normal hours of operation are M-F 8-4:30 CST.

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**D. PREVENTIVE MAINTENANCE**

A periodic inspection schedule should be established and maintained. A suggested inspection/check schedule is provided in Table 4-6. The criteria listed meet the minimum requirements necessary to ensure safe reliable service under normal operating conditions. It should be modified as required to meet varying operating and environmental conditions.

**Table 4-6. Inspection Schedules**

Procedure	As Req'd	Weekly	Monthly	6 Months	12 Months
<b>GENERAL MAINTENANCE</b>					
<b>Chains, sprockets, idler pulleys and guide surfaces:</b> Inspect for excessive wear, looseness. Repair/replace as required			X		
<b>Motor Brushes:</b> Inspect for burnt surface, chipped or damaged condition. Replace as required. Semi-annually or every 2000 operating hours, whichever comes first.				X	

**(1) Daily Maintenance**

Check the machine visually for loose nuts or bolts, parts out of adjustment, etc. Correct problems while they are small.

**(2) Monthly Maintenance**

Check all drive chains and rack and pinions for proper tension. Tighten as necessary. Grease all fittings and wipe off excess grease.

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## E. ASSEMBLY DRAWINGS & ELECTRICAL SCHEMATICS

This Assembly Drawing and Electrical Schematic sections contain drawings and schematics for your processing line equipment. The drawings contain pertinent information for the operation, maintenance, and repair of your equipment. Refer to the drawings when working on the equipment and when ordering replacement parts.

## F. ORDERING PARTS

A Parts Order form is provided for your convenience. Photocopy the form for shop use. Fill out all required spaces. Parts orders may be placed by telephone, or may be faxed to Engel Industries.

## G. RETURNS

### (1) Returning Parts For Repair

Prior to parts being returned for repair, Engel Industries Customer Service must be contacted. A **Return Material Authorization (RMA)** worksheet must be used. A **Return Material Authorization** worksheet is provided in this section for your convenience. Photocopy the worksheet for shop use. Fill out all required spaces. Telephone Engel Industries Customer Service. The following information must be received/provided through Engel Industries Customer Service.

- Name of individual requesting return.
- Component Part Number and Name.
- Cause or indication of component failure.
- Purchase Order number for repair charges and return shipping.

An RMA number will be provided by customer service, log this number on the the RMA worksheet. The statement **RETURN FOR REPAIR** and the **RMA number *must be marked on the outside of the shipping carton***. Carefully pack the faulty part for shipping, and include a completed copy of the RMA Worksheet with the part. Return freight charges are paid by the customer.

- Mark the outside of the carton "RETURNED FOR REPAIR," and the RMA number.

### (2) Warranty Returns

When a component covered by warranty fails, it must be returned to Engel Industries for evaluation and processing. A customer provided Purchase Order number is utilized to order a replacement part and cover shipping. Return freight charges are paid by the customer.

The following procedures for warranty returns and service are provided as an operating guide. Special circumstances that require variance from these procedures must be pre-approved by the Engel Warranty Administrator.

- Engel will **not** provide "loaner" parts or components while a warranty claim is being evaluated.
- Engel warrants that new equipment it *manufacturers* shall at the time of shipment, and for a period of one year on parts, be free from defects in material and workmanship. This warranty applies only to machines installed, operated, and maintained in accordance with Engel's recommendations and quotes for field specifications.

# ENGEL INDUSTRIES

- Warranty claims may be disallowed if it is determined that any claimed defect is a result of misuse, neglect, improper maintenance or repair, alterations, accident or excessive deterioration due to environmental contamination.
- The warranty does not apply to normal wear items such as lamps, switches, belts, drive chains, or electrical connectors. Warranty does not cover normal maintenance items or maintenance functions.
- Engel's obligation under this warranty is limited to repairing or replacing the failed component that Engel's inspection determines to be defective. Warranty claim items must be returned to Engel, freight prepaid, for inspection and warranty determination.
- Purchased parts (*items not manufactured by Engel*) are warranted by their vendor or manufacturer. Engel is not liable for this warranty, but will, for the convenience of our customers, process such warranty claims to the vendor.
- Hydraulic cylinders normally will not be returned to Engel. Cylinder leakage is a result of loose packing or bad seals. The tightening of packing or the replacement of seals is a normal maintenance procedure and not a warranty item.
- Assemblies will not be returned to Engel for warranty evaluation or replacement. Only the failed component of the assembly may be returned for warranty. If the customer desires to return an assembly, all labor and parts for repairing the assembly will be at a cost plus basis, with only the failed component will be covered by warranty claim. A repair PO must accompany the repair order.

Prior to parts being returned for warranty exchange or warranty repair, Engel Industries Customer Service must be contacted. An **RMA number** provided by the Service Department and a **Return Material Authorization (RMA)** worksheet must be utilized for returns. An RMA Worksheet is provided for your convenience in this section. Photocopy the worksheet for shop use. Fill out all required spaces. The following information must be entered on the RMA form:

- Customer business name and address.
- Contact telephone and fax number.
- Name of the individual requesting return (customer point of contact).
- Equipment Model and serial number of the top level equipment assembly.
- Line installation date.
- Component description, part number and serial number (if applicable).
- Part failure description. Be specific and describe the problem or failure for which the part is being returned.
- Purchase Order number for the ordered replacement part.
- Warranty Return Parts Authorization Number (RA) provided by Engel Industries .
- Reason for the part return (*warranty, repair or credit*).

Carefully pack the part for shipping, and include a completed copy of the RMA Worksheet with the part.

Mark "**WARRANTY RETURN**" and the **RMA** number on the outside of the carton.

## (a) **Warranty Claim Approved**

Once the warranty claim has been approved, a **Customer Credit** for the purchase replacement item will be issued against the purchase order under which the customer received their replacement part. Shipping costs are not reimbursed.



A **Warranty Inspection Report** for the item will be completed and mailed/faxed/or emailed to the customer.

**(b) Warranty Claim Disapproved.**

No credit is issued against the purchase order under which the customer received their replacement part. A **Warranty Inspection Report** is prepared and mailed/faxed/or emailed to the customer. This report requests part disposition from the customer. The part will be held at Engel for 30 days. Within that time frame the customer must select to have the part:

- Repaired (*if practical*) and returned at customer expense (*a repair PO must be issued*). Customer is charged parts, labor and shipping.
- Returned not repaired, freight/postage collect.
- Scrapped.

If customer direction is not received within the 30 day time frame, the part is scrapped.

**(3) Returning Unused Parts For Credit**

Unused, undamaged, parts still in their original packaging, which are approved by Engel Industries for credit return, are subject to a 35% restocking fee based on current price lists.

An **Return Material Authorization (RMA)** number is required for the part return, with the CREDIT box checked. Once received, the part will be inspected for acceptability. If the part is free from defects, and in the original packaging, a customer credit, less the **35% restocking fee**, will be issued to the customer. If the part does not meet restock requirements, a **Warranty Inspection Report** will be generated informing the customer of the inspection results and asking his disposition of the part. If disposition is not received within 30 days, the part will be returned to the customer freight collect.

Carefully pack the part(s) for shipping, and include a completed copy of the RMA Worksheet with the part.

Mark "**CREDIT RETURN**" and the **RMA** number on the outside of the carton.

**ENGEL INDUSTRIES**

182 Northwest Industrial Court  
Bridgeton, MO 63044 U.S.A.

Telephone (314) 638-0100

Fax (314) 638-6514

Web: [www.engelind.com](http://www.engelind.com)

E-Mail: Gary Paszkiewicz    [gpaszkiewicz@engelind.com](mailto:gpaszkiewicz@engelind.com)

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**CUSTOMER PARTS ORDER FORM**

**INSTRUCTIONS**

Please fill out the form with the information requested. Use extra sheet if additional parts are required. Fax to Engel Industries and we will process your order.

PARTS ORDER INFORMATION			
Customer Name:		Purchase Order No.:	
Bill To Address:		Customer Contact:	
Bill To City, State, Zip:			
Ship To Address (if different than Bill to):		Telephone No.:	
Ship To City, State, Zip (if different than Bill to):			
Payment Terms:		Parts Needed By Date:	
Shipping Information: Ship VIA: Surface <input type="checkbox"/> Air <input type="checkbox"/> Other <input type="checkbox"/> _____		Freight: Prepaid <input type="checkbox"/> Collect <input type="checkbox"/> Shipment Insured <input type="checkbox"/>	Call upon arrival?: <input type="checkbox"/> YES <input type="checkbox"/> NO Telephone No.:
Qty	Part No.	Description	Information Source (i.e., Drawing No., Manual No., Figure, Item No.)
Special Instructions:			

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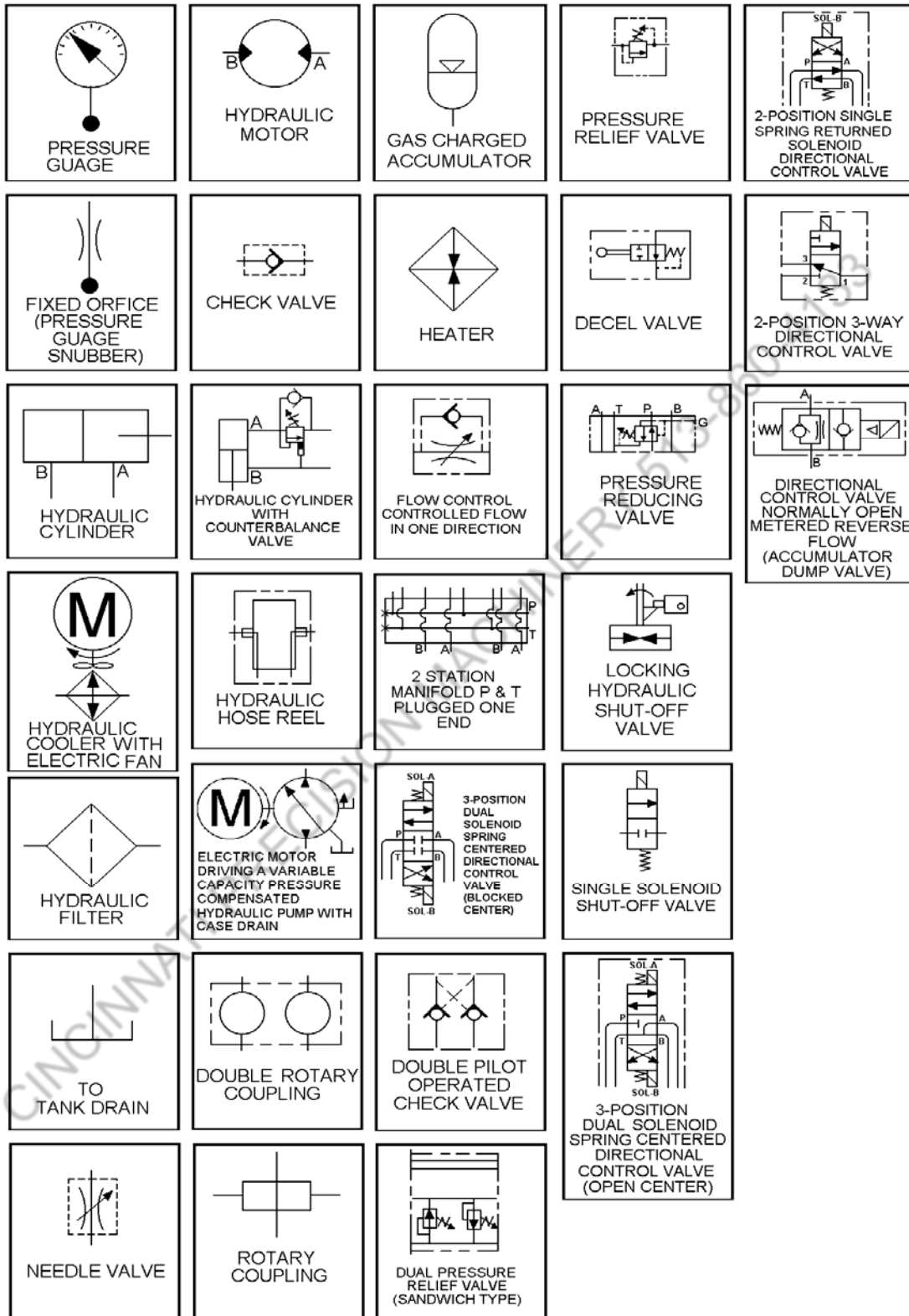




## RETURN MATERIAL AUTHORIZATION (RMA) FORM

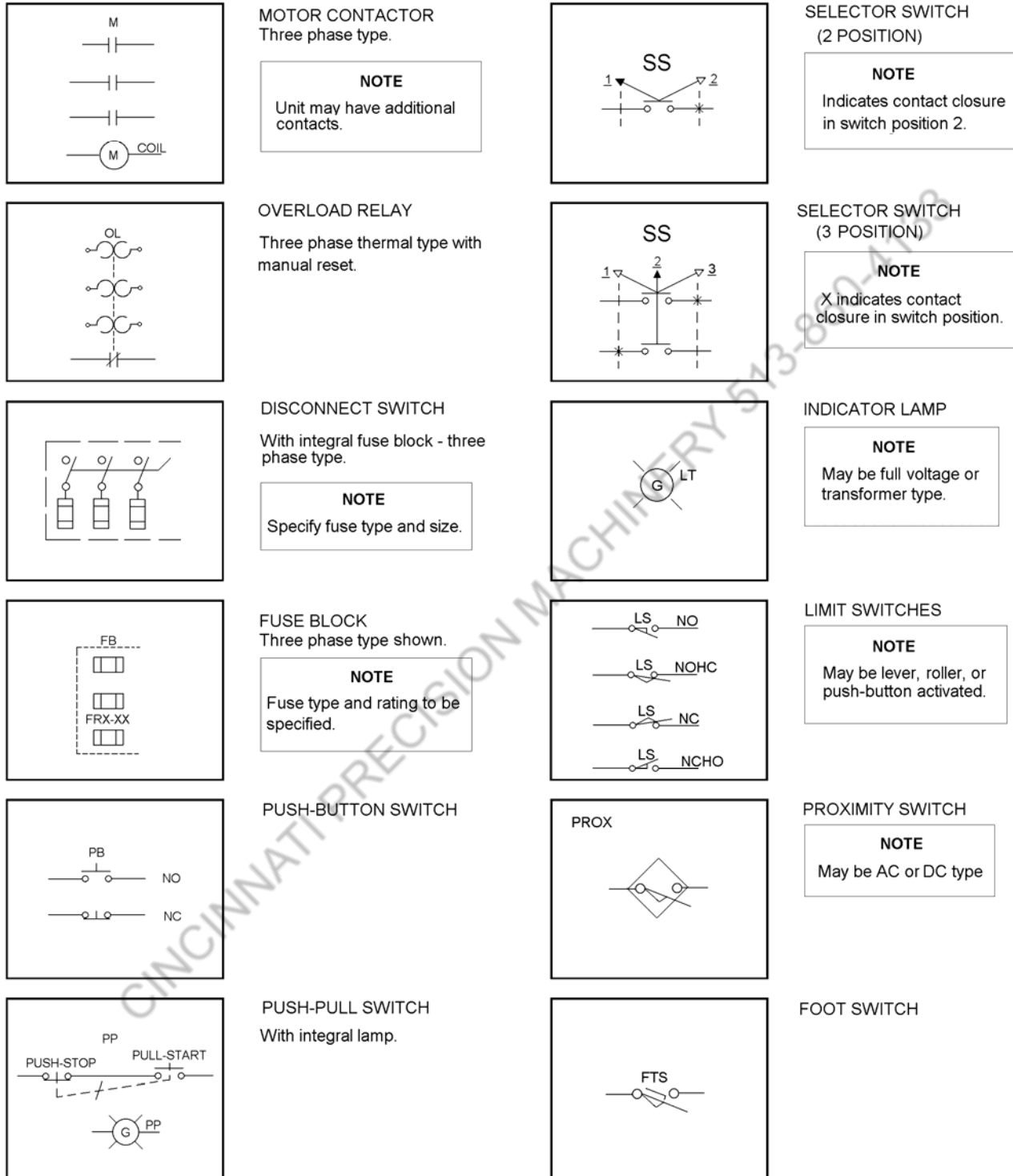
<b>CUSTOMER:</b>		RMA No. (from IPI): RMA-_____	
<b>ADDRESS:</b>		<b>CUSTOMER POINT OF CONTACT</b> (who may we call?):	<b>DATE:</b>
		<b>E-mail Address:</b>	<b>P.O. No.</b> (replacement part ordered):
<b>Telephone No.:</b> ( ) ___-_____	<b>Fax. No.:</b> ( ) ___-_____	<b>EQUIPMENT MODEL</b> (Duct-O-Matic, Whisper-Loc, etc.):	
<b>Returned Part Information</b> <b>Description:</b> <b>Part No.:</b> <b>Serial No.:</b>		<b>Line Serial No.:</b>	<b>Line Installation Date:</b>
		<b>Reason for Return:</b> <input type="checkbox"/> Warranty <input type="checkbox"/> Repair <input type="checkbox"/> Credit	
<b>PART FAILURE DESCRIPTION</b> (describe reason for return in detail. Insufficient description such as Broke, Doesn't Work, etc., are not acceptable and may delay your warranty claim):			
<p><b>RMA approved items <u>must be received by Engel within 15 days of the RMA issue date.</u> Items not received within that time period will not be accepted and will not be considered for warranty coverage.</b></p> <p><b>Note:</b> For commercially purchased parts, Engel acts as an intermediary for the benefit of the customer. Parts are returned to the original vendor or manufacturer for warranty evaluation. Any delays in notifying you of the warranty status for commercial parts is due to the manufacturer's procedures. Notification of status for Engel manufactured components is normally completed within ten business days of receipt.</p> <p>A written evaluation of your warranty claim will be provided to you. If warranty is denied, the reason will be explained and you will be asked for the disposition of the part. You may have the part returned to you as-is, freight collect; have the part repaired/rebuilt at time/material charge and returned to you; or you may request the part be scrapped. Warranty denied parts will only be held by Engel for 30 days from the date of customer notification. After that date, unless instructed otherwise, the part will be scrapped.</p> <p><b>Return Instructions:</b> Place a copy of this completed form with the component being returned. On the outside of the shipping carton, mark the carton PART RETURN, and below this write the RMA number.</p>			

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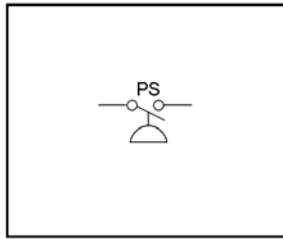


**Figure 4-1 Hydraulic Symbols Used On Assembly Drawings**

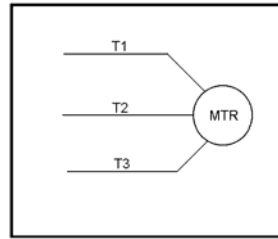
## Electrical Drawings



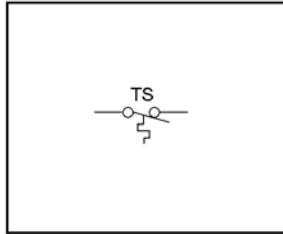
**Figure 4-2 Electrical Symbols Used On Assembly Drawings (Sheet 1 of 2)**



**PRESSURE SWITCH**

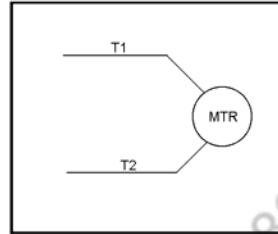


**MOTOR**  
Three phase type.

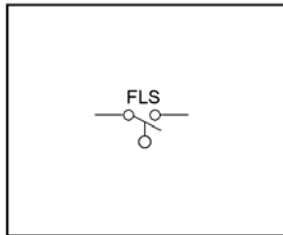


**TEMPERATURE SWITCH**

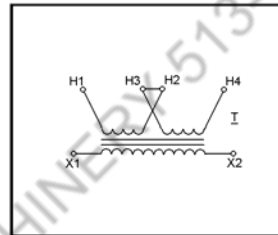
**NOTE**  
Operating temperature to be specified.



**MOTOR CONTACTOR**  
One phase type.

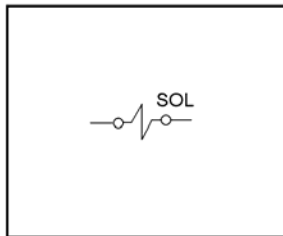


**FLOAT SWITCH**

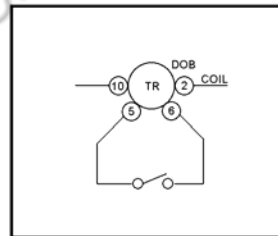


**TRANSFORMER**  
Single phase type with dual voltage primary.

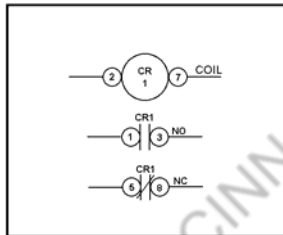
**NOTE**  
Specify primary and secondary voltage.



**SOLENOID**

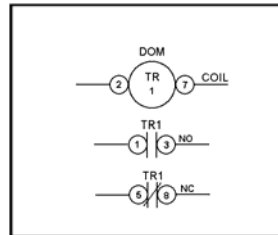


**TIMER**  
Delay on break type. Contact operation is delayed after switch is opened.



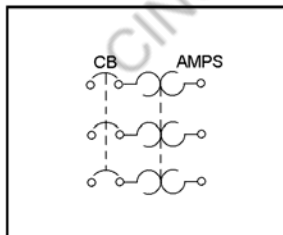
**CONTROL RELAY**

**NOTE**  
Numbers indicate socket terminal numbers.



**TIMER**  
Delay on make type. Contact operation is delayed after power is applied to coil.

**NOTE**  
Numbers indicate socket terminal numbers.



**CIRCUIT BREAKER**

Three phase thermal type with manual reset.

**NOTE**  
Specify amperage.

## Electrical Symbols Used On Assembly Drawings (Sheet 2 of 2)



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#### **H. ASSEMBLY & ELECTRICAL DRAWINGS**

The Assembly and Electrical drawings are furnished in this section for troubleshooting, parts ordering and component identification. Please use these drawings when replacement parts are required to help speed up the ordering process.

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CINCINNATI PRECISION MACHINERY 513-860-4133