

***The Union Tool Corp.***

**UNION HOT MELT  
ROLLER COATER  
MANUAL**

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## **INTRODUCTION TO THE UNION HOT MELT MANUAL**

This manual was prepared for “standard” Union Hot Melt Roller Coaters. Union Tool provides standard machines as well as special machines for your particular application. This manual provides “in-general” information on our standard equipment. Some of the information may not pertain to your particular machine, but will provide you with a general overall lubrication and maintenance guide as well as troubleshooting.

Should your company or operator have any questions regarding this manual, please do not hesitate to contact the Union Tool Corporation, Technical Sales Department at 574/267-3211. Our hours are 8:00 A.M. through 5:00 P.M. Eastern Standard Time – Monday through Friday.

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## **SAFETY**

### **SAFETY INTRODUCTION:**

Here you will find safety guidelines for use with Union Tool equipment. These guidelines apply to anyone working with Union Tool equipment, including operations and service personnel. These guidelines are repeated throughout the manual, along with specific warnings and cautions not included here. These safety guidelines cover:

- **Safety during Installation;**
- **Safety during Operation;**
- **Safety during Servicing;**
- **Safety when using Hot Melt Adhesives and Reactive Materials;**
- **What to do if Molten Material comes in contact with the skin.**

Failure to follow these recommendations may result in personal injury from burns or electrocution and/or equipment and property damage.

### **SAFETY DURING INSTALLATION:**

- Electrical:**
1. A protective electrical ground connection to a reliable earth ground is essential for safe operation. Without one, all accessible conductive components (including knobs and controls that appear insulated) can render an electric shock.
  2. A disconnect switch with lockout capability must be provided between the power source and the equipment.
  3. The power supply wire gauge and insulation must be sufficient to meet the temperature and power requirements.
  4. Only fuses of the correct type voltage rating and current rating should be used. Refer to the Union Tool wiring diagram equipment parts list for fuse recommendations. Using incorrect or non-recommended fuses can present a fire hazard.

**Pneumatic:** Union Tool has installed a lockout, three-way, manual valve in the air supply line to the filter/regulator. This valve makes it possible to relieve air pressure and lock out the pneumatic system before undertaking maintenance or repairs.

## **SAFETY (Continued)**

**SAFETY DURING OPERATION:**      **DO NOT** operate Union Tool equipment under the following conditions:

1. Near volatile or otherwise explosive gases or materials.
2. Without the covers, panel and safety guards properly installed.
3. At atmospheric temperatures below 20°F (-6°C) or above 120°F (50°C).
4. In drafty areas with the coating rolls unshielded from the draft. Rapid heat dissipation due to air movement across the rolls may cause operational problems.
5. **NEVER** use Union Tool equipment as a ladder or stepping stool.

## **SAFETY DURING SERVICING:**

1. **DO NOT** perform internal service or adjustment on any equipment unless another person capable of rendering first aid and resuscitation is present.
2. Only qualified personnel should service Union Tool equipment.
3. To avoid personal injury, never touch exposed connections and components while power is ON. Dangerous voltages exist at several points in the equipment.
4. Disconnect, lock out and tag external electrical power before removing protective panels or replacing electrical components.
5. Remove all jewelry (rings, watches, etc.) before servicing equipment.
6. If possible, stand on a rubber mat when servicing Union Tool equipment. **DO NOT** work on equipment if standing water is present. Avoid working in a high-humidity atmosphere. Cover exposed terminals and work areas with rubber sheeting to avoid accidental contact while the power is **ON**.
7. Always wear safety glasses, protective gloves and long-sleeved protective clothing to prevent injury from hot applicator parts, splashed hot melt adhesive and hot machine surfaces.

## **SAFETY (Continued)**

### **SAFETY WHEN USING HOT MELT ADHESIVES AND REACTIVE MATERIALS:**

#### **Hot Melt Adhesives:**

1. Use extreme care when working with molten materials. They solidify rapidly at high temperatures and present a hazard. Severe burns can occur if the molten materials come in contact with the skin. Even when first solidified, they are still hot.
2. Always wear protective clothing and eye protection when handling molten material or working near equipment containing hot melt adhesives.
3. Always be sure the work area is adequately ventilated. Avoid prolonged or repeated breathing of solvent vapors.

#### **Reactive Materials:**

When using reactive materials in this system, do not set the operating temperatures of the coater without first consulting the adhesive manufacturer and the Material Safety Data Sheet (MSDSs) concerning the storage, handling and use of these materials. Failure to follow the recommendation in the MSDS can lead to personal injury. If equipment is not operated in compliance with MSDS recommendations, Union Tool reserves the right to refuse service for this equipment.

### **IF MOLTEN MATERIAL COMES IN CONTACT WITH THE SKIN:**

1. **DO NOT** try to remove the molten material from the skin.
2. Immediately immerse the affected area in cold, clean water. Keep the affected area immersed until the material has cooled.
3. **DO NOT** try to remove the cooled material from the skin.
4. Cover the area with a clean, wet compress.
5. In cases of severe burns, look for signs of shock. If shock is suspected, have the patient lie down, use blankets to preserve body heat and elevate the feet several inches.
6. Call a physician immediately.

## **INSTALLATION**

Your Union Tool Hot Melt Coater is easy to install.

1. Remove the coater from the skid. The coater is very heavy so please make a note of the shipping weight and use the proper equipment. Lift from the bottom of the frame. Be sure that the lift forks are against the frame when lifting the coater from the wooden skid.
2. Place the coater in the chosen position.
3. Level the coater.
4. Hook up air exhaust to the 8" air duct opening on top of the coater. The amount of exhaust required is 500 to 1000 c.f.m., depending on the size of the coater.
5. Make the power drop to the disconnect box. The voltage should be clearly marked on the front of the disconnect box and on the electrical print inside the box.
6. Check rotation of the hot oil pump. The pump is marked as to the rotation of the pump, which is looking from the motor end of the pump, should be turning clockwise. Covers may have to be taken off to get a view of the pump rotation.
7. Make an air drop to the coater if the coater is equipped with a filter and regulator. **Please do not reduce the size of the lines of the air drop smaller than the supplied filter and regulator.**
8. Make a visual check between the coating rolls and doctor rolls; look for any loose objects that may have fallen between the rolls. Check the rotation of the coating and doctor rolls in the reverse mode. All guards and covers must be in position for the coater to operate.

## EMERGENCY CLEANUP PROCEDURES

### **CLEANING UP HOT MELT ROLLER COATER PROCEDURES DURING POWER OUTAGES**

Prior to having an actual power outage with adhesive in the machine, it would be best to have a "Plan of Action" ready so when it did happen everyone is prepared to handle the problem.

1. **Never assume that the power will come right back on.**
2. Once the adhesive starts cooling off it will start the curing processes. It is best to have a liquid cleaner ready so that you do not have to use the cleaner that would require heat to melt it.
3. The tool list would be a: Flashlight, Crescent Wrench, large pair of channel locks, rags, gloves, plastic scrapers, pair of needle nose pliers to break the chain, and Benzoflex 50 or Benzoflex 988sg (Liquid ) for the liquid cleaner.
4. Follow all of the Lock-Out and Tag-Out procedures for safety; you do not want the machine to start or give you a problem during power up if the power were to come back on. You will want a lock on the electrical disconnect switch as well as on the pneumatic circuit.
5. You are going to remove or open the cover on the end of the machine that has the main drive chain to the coating rolls.
6. Once you have gained access to the drive chain, loosen up the spring tensioners and remove the springs. Then find the master link and remove the clip, then remove the drive chain.
7. Leave the coating roll(s) and doctor roll(s) together; using the large channel locks turn the coating roll on the roll journal or sprocket in reverse to take as much adhesive off of the rolls as possible. Once you have done that on the top roll, you can continue on and do that to the bottom roll until you get all of the adhesive off the rolls.
8. Pour the liquid cleaner into the machine and either try to rotate the rolls in the forward direction or begin wiping the rolls off using your trough for quantity of your cleaner to be in position. Once you have the rolls cleaned you may open the gap between the coating roll and the doctor roll making sure that all of the rolls are not touching each other.

## **PRODUCTS FOR CLEANING / MAINTAINING HOT MELT COATERS**

### 1. Clean Up Materials / Plasticizer:

- A. Benzoflex #352 (for normal clean ups)  
Note: Your Adhesive Company may also sell this same product.

#### **EMERGENCY CLEANUP MATERIALS**

Benzoflex 50 or Benzoflex 988sg (Liquid) for the liquid cleaner

Order from Chempoint 425-378-8582

Or

Eastman Chemical Co. Phone: 800-327-8626 x 2987

for distributor referral and questions about product

- B. Polyad Company  
Product: Uniplex #260  
Phone: 847-526-3322
- C. Dynaloy Inc. Dynaloy has a variety of urethane cleaning products.  
Phone: 800-669-5709

### 2. Urethane Release Agent – Manufacturer is B & S Products Corp.

Product: Omniwax #1622

Phone: 574-537-0770

### 3. Pipe Sealant

Product: Loctite 567 PST

Contact: Local Vendor

### 4. Heat transfer oil for the machines heating system

Product: Petro-Therm

Contact: Local Vendor or call Petro Canada, Customer Service and ask for a distributor in your area – USA 1-888-284-4572.

**NOTE:** The Petro-Therm heat transfer oil is comparable with Mobiltherm 43 or you can use other heat transfer oils from other manufactures as long as there are comparable with the oils listed.

or

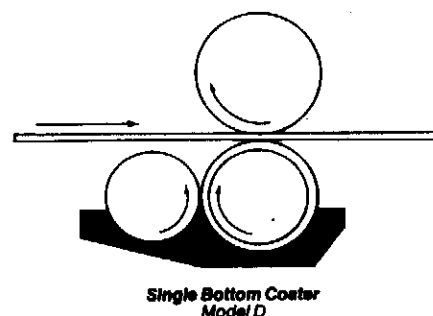
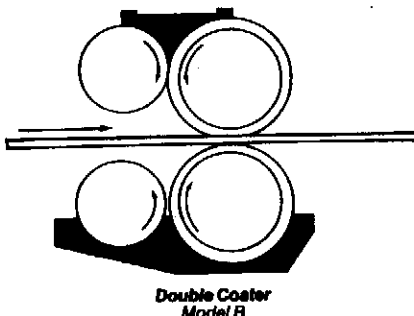
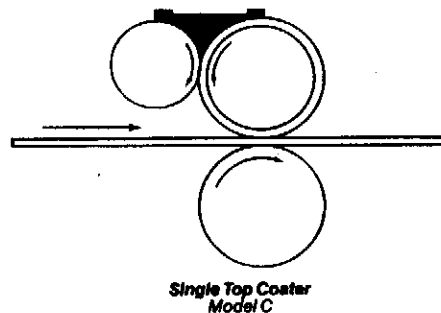
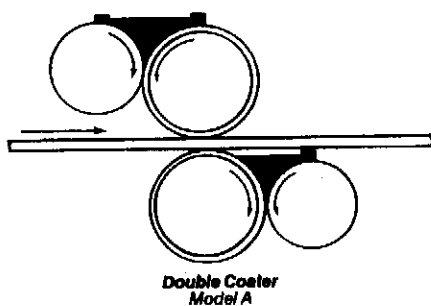
AS an alternative you can use Mobil Mobiltherm 43

Contact: Local Vendor or Mobil Oil, Customer Service and ask for a distributor in your area – Phone: 800-662-4525. Mobile Customer Service Department is very helpful and can tell you the location of their distributors.

**PRODUCTS FOR CLEANING / MAINTAINING HOT MELT COATERS (Continued)**

- 5. Mobil System Cleaner – Manufacturer is Mobil  
Product: Mobil System Cleaner  
Contact: Local Vendor or Mobil Oil, Customer Service – see above.  
Note: The system cleaner is used in older or contaminated heating systems.
  
- 6. Oil for the Gear Box – Manufacturer is Mobil  
Product: Spartan Synthetic EP 460 oil  
Contact: Local Mobil Vendor or Mobil Oil, Customer Service – see above.
  
- 7. Grease for lubrication for bearings – Manufacturer is Dow Corning  
Product: Dow Corning 41 or any good grade of grease with a temperature rating of up to 400° F.  
Phone: Local Vendor.
  
- 8. Chain Lube – Manufacturer is Dow Corning  
Product: C-40 High temp chain lube  
Phone: Local Vendor.

**This shows some of the different types of roll configurations used on Union Tool roller coating equipment.**



## **PUSH-BUTTON CONTROL BOX (and their operations)**

Note: The push button operation and layout is for the standard machines.

**PB-2** Coater “**start**” push button will start the coating roll drive. The drive will start as long as the infeed and offbear clear lexan covers are in the closed position and the safety cable is in the forward or reverse position. Magnetic switches ensure that the covers must be in position for the coater to start.

**PB-1** Coater “**stop**” button will stop the coating roll drive.

**PB-4** Pump “**start**” button will start the hot oil recirculating pumping system. Should you press this button and the light does not stay, the selector switch SS-4 heater “**auto/ man**” may be in the auto position and should be in the manual position.

**PB-3** Pump “**stop**” button will stop the hot oil recirculating pumping system. Should you press this button and the green start light does not turn off, the selector switch SS-4 heater “**auto/ man**” may be in the auto position and should be in the manual position. On most machines built after September 2001, the pump stop button will also reset the safety over-temperature controller. See Warning under MAINTENANCE FOR A UNION HOT MELT ROLLER COATER.

**SS-2** Top-level selector switch controls the delivery of coating materials to the top coating head. If you turn the selector switch to the “**manual**” position, the delivery of coating materials will continue until you release the switch. Once the switch has been released, it will return to the “**off**” position. When the switch is turned to the “**auto**” position, it will remain in that position until it is manually turned to the “**off**” position. Once in the auto position, the level control photocell will automatically control the level of the coating material.

**SS-3** Bottom level selector switch controls the delivery of coating materials to the bottom coating head. If you turn the selector switch to the “**manual**” position, the delivery of coating materials will continue until you release the switch. Once the switch has been released, it will return to the “**off**” position. When the switch is turned to the “**auto**” position it will remain in that position until it is manually turned to the “**off**” position. Once in the “**auto**” position the level control will automatically control the level of the coating material.

**SS-1** Heater “**on**” and “**off**” selector switch. When the selector switch is in the “**on**” position will allow the heat to turn on when the pump is activated. When the switch is in the “**off**” position the heater will not heat.

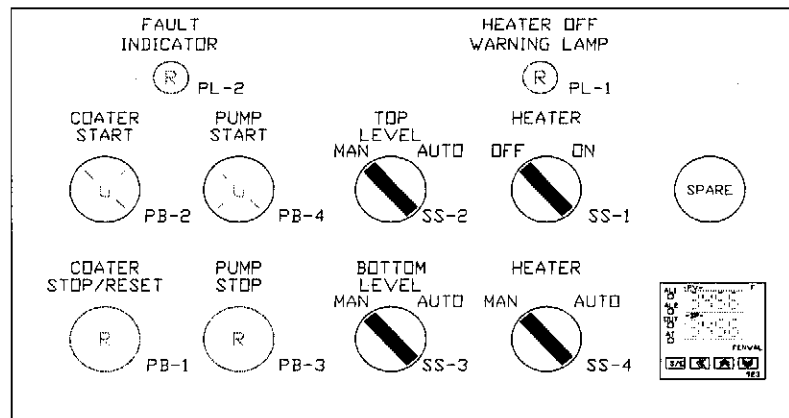
**SS-4** Heater “**auto/man**” selector switch. When the switch is in the “**manual**” position, the pump must be activated manually. When the switch is in the “**automatic**” position the pump will start and stop automatically controlled by the 7-day timer.

## **PUSH-BUTTON CONTROL BOX (Continued)**

**PL-1** Pilot light heater off is a warning that the heater switch is in the “**off**” position and the machine will not heat up. This switch is normally used for maintenance.

**PL-2** Pilot light fault indicator. This red light indicator is telling you that the coater drive has faulted and stopped. The reset to clear the fault is the coater stop button.

The temperature controller is a device that will control the temperature of the rolls. To change the temperature you must first press the “**set/enter**” button, then press the up or down arrow buttons until you raise or lower the setting to the desired temperature, then press the “**set/enter**” button.



## HOT MELT ROLLER COATER START UP PROCEDURE

1. **HEAT ROLLS:** Oil heater and pump should be turned on to heat the rolls. When the temperature has reached the preset setting on the digital readout the coater is ready to start coating. Depending on the temperature of the location where the roller coater is located, heat up time could take approximately one hour or more depending on the size of the coater and temperature needed to coat with.
  
  2. **START ROLLS "FORWARD":** Either while the rolls are heating or after they are up to temperature, the coater may be started by engaging the "**start coater**" button. To ensure proper direction, make sure reversing the lever is in "**forward**" position.
  
  3. **ROLL ADJUSTMENTS:** Make the proper roll adjustments using the mechanical digital indicator for each adjustment. This includes the top vertical adjustment which controls the height of the top coating assembly should be set for thickness of parts being coated. Also, one or both doctor rolls should be set for proper coating weight or thickness.
- NOTE:** During this time the drum unloader should be placed in the heat up mode. The pump of the drum unloader should be in the "**off**" position.
4. **ADD ADHESIVE:** Only when the oil temperature has reached the preset temperature and roll adjustments have been made should adhesive be added to the roller coater. Only add adhesive when ready to coat parts.

## **HOT MELT ROLLER COATER** **CLEAN-UP PROCEDURE**

1. The most efficient way to clean the coating head is to use as much adhesive within the rolls while coating product. Any adhesive left in the rolls when production is over will be wasted. Therefore, before the end of the production run, turn off the level controls on the roller coater so no more adhesive is added to the coater. The level controls may be run manually in order to add a small amount of adhesive if needed. This will help lower the amount of waste as much as possible.
2. If both coating heads (top and bottom) were being used, you do not need to move the top vertical adjustment. If only coating the top coating head was used, raise the top coating assembly to about 3"; stop the coater and insert the cleanup pan. The cleanup pan and catch pan may be lined with plastic or paper; this will make it easier to clean up when the adhesive and plastisizer (clean up material) have cooled and hardened.
3. If you are cleaning both the top and bottom coating heads, do not make any doctor roll adjustments. Stop the coater by moving the reversing switch to neutral and raise lexan hood for access on the backside of the coater. Remove the backside pick-off fingers hinge pin and hinge, which will open the pick-off finger table. Once the lexan hood is open, the machine will not be able to be started. The infeed table should also be hinged open during the cleaning of both coating heads. If the infeed table is not hinged open when the rolls are reversed, adhesive and or benzoflex may be deposited on the table.
4. Add cleanup material to one or both coating assemblies in between the doctor and coating rolls. Close the lexan hood and move the doctor roll against the coating roll, just as you would to apply a minimum coating. Start the roller coater in the forward position. Allow the cleanup material to revolve with the adhesive for several minutes. The coating roll will be cleaned by allowing this material to dissolve.
5. After several minutes, reverse the direction of the coating rolls by moving the reversing drum switch to reverse. This will allow all material between the rolls to be squeezed out from the bottom of the rolls into the cleanup pans or catch tray.
6. Repeat #4 and #5 approximately 3 times at which time all rolls should be clean of any adhesive and only have a residue of cleanup material on them.
7. After repeating #5 for the last time, be sure to adjust doctor roll away from the coating roll to ensure they are not touching. This may be done while rolls are still revolving. Leaving roll together will cause a flat spot on rubber coating rolls.

### **HOT MELT ROLLER COATER - CLEAN-UP PROCEDURE (Continued)**

8. Once rolls are apart and clean, stop coater by engaging "**coater off**". Raise lexan hood and remove seal plates by pulling pins and lifting seal plate out. Gloves (high temp) will have to be worn when moving seal plates. With Gloves on, clean ends of the rolls and face of seal plates using heavy shop rags.
9. Wipe down roll face of each roll using clean shop rag to remove cleanup residue.
10. Lower lexan hood and close pick-off finger table using pin to lock table shut.

**NOTE:** Allow approximately 45 minutes for entire cleanup. Cleanup is most important to the function of this equipment.

### MAINTENANCE CHECK LIST

1.	The two covers will need to be removed on the offbear end to gain access to the drive components.	<input type="checkbox"/>
2.	Remove the seal plates from the machine.	<input type="checkbox"/>
3.	The drive chain will need be removed from equipment as well as the doctor roll drive chain.	<input type="checkbox"/>
4.	All idler sprocket assemblies and coating roll and doctor roll bearings need be inspected as well as lubricated. Replaced as required.	<input type="checkbox"/>
5.	The drive chain needs be inspected and replaced as required.	<input type="checkbox"/>
6.	Tension springs on the chain drive will need to be inspected and replaced as required.	<input type="checkbox"/>
7.	If the balance of this part of the inspection has been completed, then reassemble.	<input type="checkbox"/>
8.	The single handwheel adjustment – this control will be lubricated as well as checked out for moving freely and will re-zero the mechanical digital indicator so it reads out correctly with the proper gap setting.	<input type="checkbox"/>
9.	The unifeed adjustment will need to be checked out for operation and wear as well. If any parts show ware replace as required. Check it for parallelism and make any adjustments as necessary and set the mechanical digital indicator to read out the gap setting for the opening of the roll.	<input type="checkbox"/>
10.	On A/D coaters – you will need to check out slide plates for the upper coating head assembly as well as the backup roll and lubricate the guides and make any adjustments to these motions as required.	<input type="checkbox"/>
11.	All motors will need to be blown off and cleaned up as much as possible, as well as the gearbox needs to be checked for the level of gear lube inside it.	<input type="checkbox"/>
12.	Heat the machine up to the operating temperature.	<input type="checkbox"/>
13.	Check the hot oil system for leaks.	<input type="checkbox"/>
14.	Check to make sure the safety over-temperature controller for the hot oil heater functions properly.	<input type="checkbox"/>
15.	Check the level control to confirm it is functioning properly.	<input type="checkbox"/>
16.	The hot oil sight gage will need to be cleaned.	<input type="checkbox"/>

<b>YEARLY MAINTENANCE SCHEDULE</b>		
1.	Follow the same procedures on the Maintenance Check List, as well as the following items.	<input type="checkbox"/>
2.	Drain the heat transfer oil from the hot oil recirculation system ( <b>see Note 1</b> ).	<input type="checkbox"/>
3.	Clean the heater, if necessary.	<input type="checkbox"/>
4.	Clean the screen in the hot oil recirculation system.	<input type="checkbox"/>
5.	Refill the system ( <b>see Note 1</b> ).	<input type="checkbox"/>
6.	The coater drive gearbox should be drained and replenished with fresh gear lube.	<input type="checkbox"/>
7.	All electrical connections on the main control panel will need to be checked out and tightened on the terminal stripes as well as the components inside the electrical box.	<input type="checkbox"/>
8.	Heat the machine up to the operating temperature. Check that all the rolls are heating up to temperature.	<input type="checkbox"/>
9.	Check system for leaks.	<input type="checkbox"/>
10.	Check to make sure the safety over-temperature controller for the hot oil heater functions properly ( <b>see Note 2</b> ).	<input type="checkbox"/>

**Note 1:** Please look at the Hot Melt Roller Coater Hot Oil System preventative maintenance.

**Note 2:**

## **WARNING**

### **CHROMALOX HEATER SAFETY OVER-TEMPERATURE CONTROLLER:**

**DO NOT** set the temperature of the over-temperature controller above 525°F. **An improperly set over-temperature controller may cause a fire.** Carefully look at the front indicator as it reads out in Celsius as well as in Fahrenheit. This unit is located near the heater. Should your digital temperature controller at the pushbutton station go blank, you may push the small black reset button on the front of this safety over-temperature controller or the pump stop/ reset button . Once you have enabled the reset button on the face of this unit your digital temperature controller should power backup. If this safety over-temperature controller continues to trip out and needs to be reset, the hot oil system should be checked immediately. The cause of this over-temperature alarm may be either caused by a flow problem or the heater has sludge or carbon buildup on the heating elements. There is also a "Y" strainer/filter in the suction line below the expansion tank for the pump that can get plugged and slow down the oil flow through the heater causing an over-temperature condition. Please consult your owner's manual for more information.

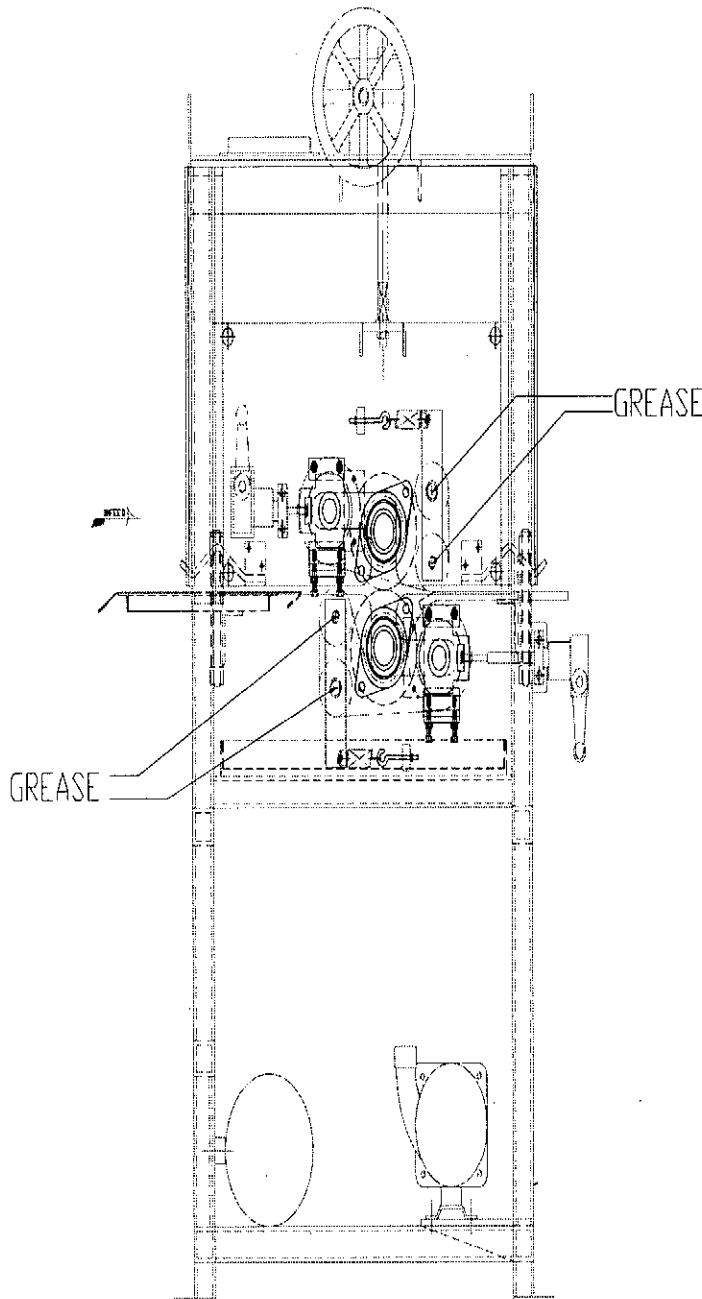
## **MAINTENANCE FOR A UNION HOT MELT ROLLER COATER**

1. One of the first items to look for is to make sure there are 1" to 2" of oil in the sight glass in the expansion tank on top of the machine.
2. There is an air filter on the electrical control box that should be cleaned weekly.

### **Lubrication Guide:** *(See Page 19 & 20 for Diagrams)*

**NOTE:** Follow the lockout and tag out procedures so no one will be injured while working on this equipment, locking out all the pneumatic and electrical connections to the machine.

- a) Open or remove the 2 covers on the offbearing side of the coater – the main drive for the coating rolls has 5 idler sprocket assemblies that need grease.
- b) There would also be 2 coating roll bearings as well as 2 doctor roll bearings.
- c) There are also 4 rotary union that may or may not require grease -- You will need to review the manual for that specific machine to determine if these rotary unions require any lubrication.
- d) Also, the electric motor has 2 grease zerts on them?
- e) There is also a gearbox that requires the oil level to be checked every time you service the machine and are greasing any of the bearings.
- f) On the opposite end of the machine there is the doctor roll drive that has 2 idler sprockets for each coating head assembly, so there would be 4 spots to grease on those idler sprockets as well as 2 coating roll bearings and 2 doctor roll bearings.
- g) In addition, there are rotary unions that may require lubrication as well.
- h) The other 2 spots on this machine to grease are the gearbox assemblies that move up and down the upper coating head for the different thickness of your products to be coated.



LUBRICATION GUIDE  
POINTS FOR LUBRICATION

- 1. MODEL A - 8 ROLL BEARINGS  
MODEL C - 6 ROLL BEARINGS
- 2. COATER DRIVE - 5 IDLER SPROCKETS
- 3. DOCTOR ROLL DRIVE - 2 IDLER SPROCKETS
- 4. 2 POINTS ON TOP SINGLE HAND WHEEL  
1 ON EACH GEAR BOX ASSEMBLY.

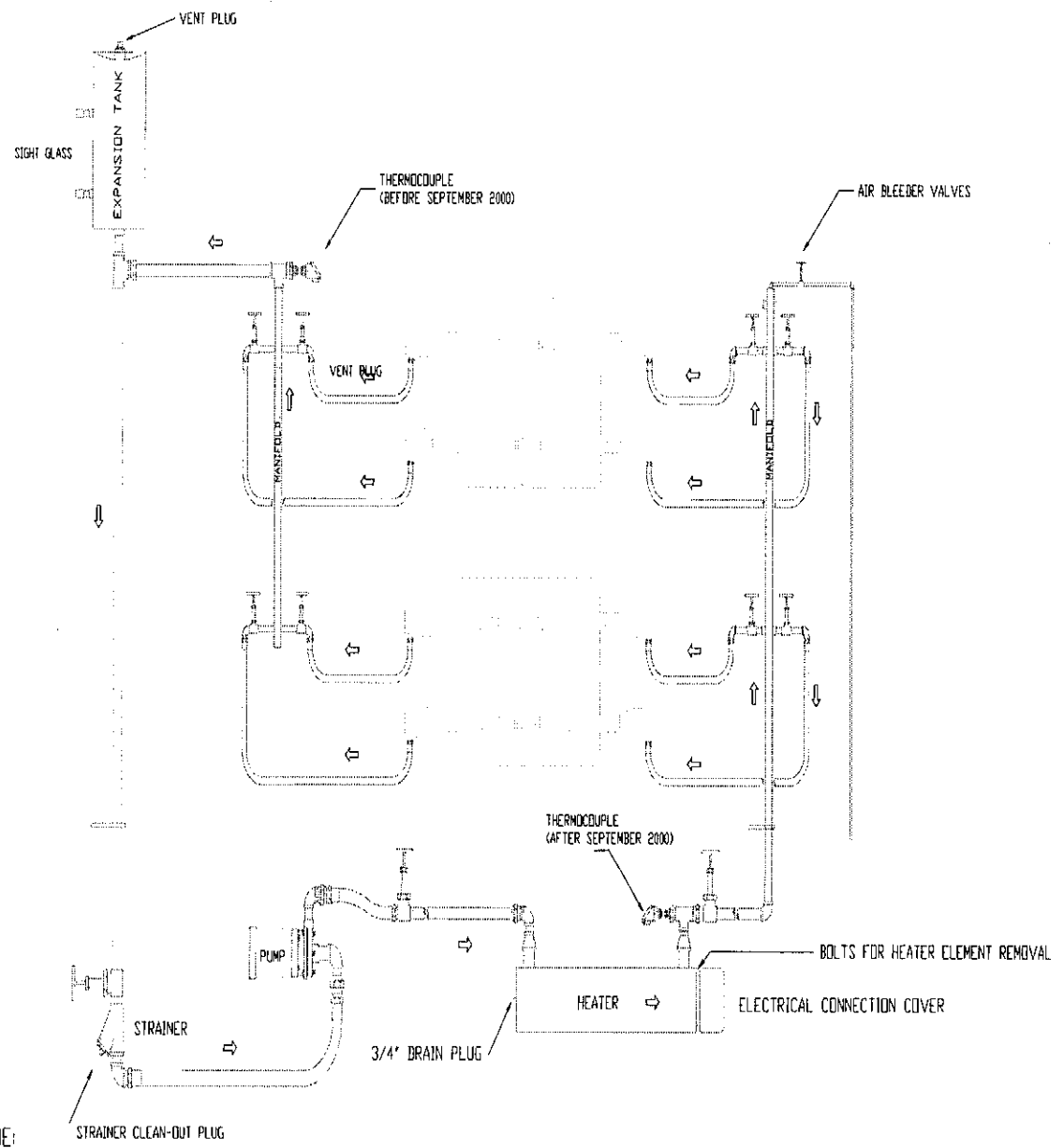
NOTE: ALL BEARINGS HAVE BEEN FILLED WITH HIGH TEMPERATURE GREASE: DOW CORNING 41 EXTREME HIGH TEMPERATURE GREASE.

THE COATER GEAR BOX HAS BEEN FILLED WITH EXXON SPARTAN SYNTHETIC EP 460 OIL.

LUBRICATION INTERVAL TO GREASE BEARINGS 1 TO 4 WEEKS DEPENDING UPON HOURS OF MACHINE RUNNING TIME.

ITEM #	ITEM QTY.	DESCRIPTION
BILL OF MATERIAL		
✓ SURFACE FINISH PER ASA STANDARDS TOLERANCES UNLESS OTHERWISE SPECIFIED DIMENSIONS FRACTIONS 1/16"	DRAWN S.K. HEMMER CHECKED APPROVED SCALE 1=6 DATE 11/1/95 SHEET 1 OF 4 DIMENSIONS ANGULAR 1/16"	THE UNION TOOL CORP WARSAW IN. DWG. TITLE DOCTOR ROLL LUBRICATION JOB No. DRAWING No. 15LUBE-C

REV.	DESCRIPTION	DATE



**OIL LEVEL GUIDE:**

**WARNING!!** OVER FILLING OF THE RESERVOIR/EXPANSION TANK COULD RESULT IN SERIOUS BURNS.

TO LEAVE ROOM IN THE SYSTEM FOR OIL EXPANSION, A MINIMUM OF 2" AND A MAXIMUM OF 3" OF OIL SHOULD BE SHOWING IN THE SIGHT GLASS WHILE THE MACHINE IS COLD.

DO NOT TURN ON THE PUMP OR HEAT THE OIL IF THE OIL LEVEL IS NOT SEEN IN THE SIGHT GLASS.

HEAT TRANSFER OIL - EXXON CALORIA HT 43

1		2		3		4		5		6	
✓		S.K. HEMMER		C		THE UNION TOOL CORP		WARSAW IN.		MOTT OIL DIAGRAM	
1-6		DIMAPES		4 OF 4						15LUBE-D	
1		UPDATED		DATE							

## **ROLL CHANGES – REMOVING OF THE COATING ROLLS:**

1. Follow the lockout and tag out procedures so no one will be injured while working on this equipment, locking out all the pneumatic and electrical connections to the machine.
2. First you will need to remove the 2 covers on the offbearing side of the machine to gain access to the drive and bearings.
3. Remove the offbearing Lexan guard as well as the top cover.
4. When removing the rolls, shut off the valves shutting off all oil flow on both ends of the rolls. There is a valve connected to a flexible hose that goes to each rotary union that is attached to each one of the rolls.
5. Remove the seal plates from the machine.
6. Remove the doctor roll drive chain and sprockets. You will also need to have a bucket to catch the oil when removing the rotary unions from the end of the rolls. The threads for these rotary unions are standard right-hand threads – Clockwise is tightening and Counterclockwise would be loosening.
7. Each rotary union is removed from the roll, you should hang the hose so it will drip into the bucket and collect as much oil as possible. Also install a 1/2" pipe plug in place of that rotary union to capture the oil that is still in the roll.
8. After removing rotary unions from the rolls that you are going to remove, you will need to disconnect the main drive chain. Loosen the tension on the springs and then remove the springs. You will need to remove both coating roll drive sprockets as well as loosen the set screws in the bearing holding the roll in place. At this time, you will notice that there are set screws holding the roll into place only on one bearing on the main drive of the machine. On the doctor roll drive end of the machine, there are no set screws in those bearing; this is to allow for roll growth due to the heat expansion of the rolls. Use a hoist or forklift to pickup and support the roll from the journals and not from the rubber portion of the roll. Using a spreader bar to spread out the straps or hooks to lift the roll, as not to damage rubber on the end of the rolls. Once the roll is supported, you may then remove the bolts to remove the bearings from the rolls. Once that is complete, you will need to open the coating roll gap to approximately 4" to 5" so you can push the roll to either the left-hand side of the machine or to the right-hand side of the machine so you can cock and remove the roll out from the offbearing side of the coater.

**ROLL CHANGES – REMOVING OF THE COATING ROLLS (Continued):**

9. Once that is complete and you are sending these rolls back for recovering or regrinding, you should drain all of the oil from these rolls (as much as possible).
10. Repeat above procedure to reinstall the rolls using anti-seize on the shafts so they will slide freely into the sprockets as well as the bearings. This will make it easier for removal the next time you do a roll change.
11. Once you have everything back into place, you will need to align the rolls and set the gap between the two coating rolls as well as the doctor rolls in relationship to the coating rolls. This may be done with a feeler gauge.
12. There are couplings on each one of the adjustments for moving in and out of the doctor rolls, so you may parallel the rolls so that the gap is even at each end of the roll.
13. You will also need to make sure that the ends of the coating rolls are flush with the doctor rolls, as far as left to right, so no leakage will occur in the seal plates. If the seal plates are grooved deeply or damaged and have been leaking, you will need to replace the seal plates at this time.
14. There is a set screw on the mechanical digital indicator that you may reset the indicator for the gap of your feeler gauge. To loosen the set screw you may turn the hub of the indicator while holding the shaft in place until the indicator reads the feeler gauge thickness, then tighten the set screw.
15. Once you have completed all of the above steps, you will need to hook the main drive chain back up to the coating rolls as well as reinstall rotary unions. We recommend you use Loctite 567 PST as a pipe sealant for sealing the threads and locking the rotary union into position.
16. On the other side of the coater, you will reinstall the doctor roll drive sprockets as well as rotary unions following the same procedure as you did on the main drive.
17. Once this is complete, you will open all of the valves that you had previously closed allowing the oil to flow through that system. On the doctor roll drive side there is a hand valve that may be opened and closed to help work out the air in the system once you have started the pump again. Remembering that you may need to add oil to the expansion tank to keep the oil level at 2" to 3" in the sight glass.
18. Once all your covers are back in position, you may start turning the rolls, heating and working the air out of the rolls and heating system.

## **Preventive Maintenance**

### **Hot Melt Roller Coater Hot Oil System Procedure:**

The hot oil system should be **drained and the oil changed yearly**. The oil in the unit over a period of time can accumulate a build up of sludge or carbon build up on the heaters inside the hot oil heater. This causes the Safety Over Temperature Controller (located at the bottom right-hand corner of the front panel) to activate, which will shut off the oil heater. This Over Temperature Controller is preset at Union Tool to 525°F.

**Note:** If the Safety Over Temperature Controller has been tripping out and needs to be reset, the hot oil heating system should be checked immediately or you can have a fire.

The cause of this Over Temperature situation may be either an oil flow problem or the heater has sludge or carbon that has built up on the heater elements that slows the transfer of the heat from the heater elements to the oil. There is also a “Y” strainer with a screen in the plumbing system that can get plugged and slows down the oil flow through the heater causing an Over Temperature condition.

**WARNING:** If you raise the Safety Over Temperature Controller above the normal setting of 525°F this can cause a fire.

The following procedure for all Union Tool Hot Melt Roller Coaters is advised.

### **PROCEDURE – HOT MELT OIL CHANGE**

We recommend that the oil be **changed a minimum of one time per year**.

#### **DRAIN OIL**

1. The cleanest way to drain the oil from the coater is to remove the covers on the front of the coater and turn the valves at the end of the hot oil heater to the “off” position. Remove the ¾ pipe plug at the end of the heater. Quickly install a shutoff valve with a barb fitting for a hose. Attach a hose to the shutoff valve and run the other end of the hose into a barrel or container that will hold up to twenty-five (25) gallons of oil. The hole in the container should be minimal as the oil will come out with some force. Turn the valves at the end of each heater to the “on” position. Then remove the plug in the top of the expansion tank. Use a reducing bushing to plumb in **filtered and regulated** air supply with a maximum air pressure of 20 to 30 p.s.i. Once the air supply is turned on you will see the oil is being pumped from the machine, this will take about 3 to 5 minutes. When the oil flow has stopped the air supply may be turned off; reinstall the pipe plug and remove the air supply.

## **PROCEDURE – HOT MELT OIL CHANGE – Drain Oil (Continued):**

2. If you were not having any problems with the hot oil recirculation system and this is only a change of oil, you do not necessarily need to clean the heater. However, you should clean the "Y" strainer screen before adding oil to the top of the expansion tank. The coater takes approximately 15 to 25 gallons of oil.
3. If the coater has been slow heating or the Safety Over Temperature Controller has been tripping, you will need to clean the heater elements as well as the "Y" strainer screen.
4. Un-wire the heater being sure to note the connection to each wire under the cover of the hot oil heater.
5. **Note: When removing the wires for the thermocouple - white wire is positive - red wire is negative. If wired wrong you could have a fire. This thermocouple is for a safety over temperature controller.**
6. Place cardboard around the floor under the end of the heater. The removal of the heater elements is not a clean job so do not hesitate to use plenty of cardboard.
7. By loosening the eight (8) bolts at the top of the heater, the heater elements can be removed by sliding out the heater elements located in the tank heater. There is a gasket at the top of the tank. Care should be taken not to damage the seal if possible. The sludge collected on these heaters prevents the machine from heating up in a timely fashion. It restricts the flow of oil through the heater.
8. With the heater elements removed, clean the elements as needed. This may be done with a scrapper blade or wire brush, depending on the amount of sludge.
9. When the heater elements are clean, they may be placed back into the heater. A sealant such as a high temperature silicone sealant should be used with the gasket. If the gasket has been damaged the silicone sealant will work alone.
10. Tighten all eight bolts. Leave the covers off so that the bolts may be tightened again if need be.
11. Rewire the heater.
12. Open all valves and add the new oil to the top of the expansion tank located at the top of the coater. When there is 1" to 2" of oil in the sight glass **stop** filling and start the pump. Run the pump for approximately 5 minutes. If there is oil still in the sight glass, turn on the heater and heat up the coater. After the machine has cooled down you may need to add oil until there is 3" of oil in the sight glass. Air in the system can be removed through the use of the bleeder valve in the plumbing.
13. Heat the coater and inspect all plumbing. Tighten any plumbing that may have leaks.

## **Trouble Shooting Guide**

### **Roll Heating Problems:**

Heating the machine after servicing the heating system or roll changes.

The machine should be warmed up slowly to avoid a vapor creating a vapor lock in the rolls. After you have worked on the machine, you should follow the next few steps before returning the machine to normal operation.

1. Before you tighten the seal plates the pump should be started without the heat – start the rolls turning in reverse at full speed – run for about 15 minutes to establish oil flow and to start working the air out of the heating system.
2. Next Step – turn on the heater and set the machine temperature to 100°F for about 15 minutes, to continue working the air out of the heating system.

**NOTE:** You should use a metal bucket under the air bleed valve to release any air that is trapped in the manifold located on the opposite of the expansion tank.

3. Turn on the heater and set the machine temperature to 150°F and run for about 15 minutes after it is up to the set point to continue working the air out of the heating system – You can open the air bleed valve and release any air that is trapped in the manifold.
4. Turn on the heater and set the machine temperature to 200°F and run for about 15 minutes after it is up to the set point to continue working the air out of the heating system – You can open the air bleed valve and release any air that is trapped in the manifold.
5. Turn on the heater and set the machine temperature to 250°F and run for about 15 minutes after its up to the set point to continue working the air out of the heating system – You can open the air bleed valve and release any air that is trapped in the manifold.
6. Last Step – Set the temperature about 25°F about your normal running set point and just run the machine long enough to get temperature up to the set point, then you can turn off the pump – You can open the air bleed valve and release any air that is trapped in the manifold.

**WARNING** – You should never try to remove rotary unions, flex hoses or open the heating system if the machine has been heated. Failure to follow these recommendations may result in personal injury from burns and/or equipment and property damage.

## **Trouble Shooting Guide (Continued) - Roll Heating Problems**

**NOTE:** First thing to check is whether the hot oil circulation pump is running in the correct direction (clockwise, looking from the motor end towards the pump).

<b>Problem</b>	<b>Possible Cause</b>	<b>Corrective Action</b>
Rolls are cold or not as hot as the others.	<ol style="list-style-type: none"> <li>1. The valves to the cold roll are not opened or not fully open.</li> <li>2. The one or both of the flex hoses have been kinked.</li> <li>3. If the rotary union is bad, they can twist up a flex hose.</li> <li>4. A vapor lock can cause rolls to be colder or have a temperature difference across the roll face – hot on one end and a lot cooler on the other end.</li> </ol>	<ol style="list-style-type: none"> <li>1. Open all valves, except air bleed valve.</li> <li>2. Replace damaged hoses.</li> <li>3. Replace rotary union and flex hose.</li> <li>4. To fix a vapor lock: <ul style="list-style-type: none"> <li>– remove the flex hose at the ball valve (at the end of the machine with the expansion tank)</li> <li>– The machine <b>MUST BE</b> cool enough to touch the rolls so as not to be burned by hot oil.</li> <li>– Turn off both valves to the roll that you think has a vapor lock</li> <li>– Remove the flex hose from the attachment closed to the ball valve</li> <li>– Place the hose end into a steel bucket and have someone open the valve on the opposite end of the roll and have them job the pump to push the air lock out of the roll (you can see the air bubbles exit the hose)</li> <li>– Close the valve and re-attach the hose and open the valves</li> <li>– Slowly bring the machine up to temperature.</li> </ul> </li> </ol>

## Trouble Shooting Guide (Continued) - Roll Heating Problems

### Heater Technical Data:

1. First of all check to make sure that the temperature controller has an out light on indicating that the controller actually wants the temperature to raise.
2. **Note:** After step one; be sure all electrical work is performed by a qualified electrician only. Beware of **HIGH VOLTAGE** in systems with electrical equipment. **CONTACT WITH LIVE ELECTRICITY CAN BE FATAL.** Be sure all electrical work is performed by a qualified electrician only. Be sure all electrical equipment is installed and operated only in compliance with applicable codes. **MAKE SURE POWER IS DISCONNECTED WHEN SERVICING AND REPAIRING EQUIPMENT.** Have any checks, installation, or service to performed by a qualified electrician only.
3. Open the electrical disconnect box and check the fuses. If fuses are blown this usually is an indicator of other problems in the electrical system. You will need to check wiring for loose connections or shorted wiring. Use an OHM meter to check for a shorted heater to ground. When replacing fuses only use the correct size and type of fuse.

Three phase balanced load amperes and heater OHM resistance at:

HEATER KW	240 VOLT		480 VOLT		575 VOLT	
	Amps	Ohms	Amps	Ohms	Amps	Ohms
15	36.2	5 to 8 $\Omega$	18.1	26 to 30 $\Omega$	15.1	38 to 42 $\Omega$
20	48.2	4 to 5 $\Omega$	24.1	19 to 22 $\Omega$	20.2	28 to 32 $\Omega$
25	60.3	3 to 4 $\Omega$	30.2	15 to 18 $\Omega$	25.3	22 to 25 $\Omega$
30	73.3	3 to 4 $\Omega$	36.2	13 to 15 $\Omega$	30.4	18 to 20 $\Omega$
50	120.5	1.5 to 2.5 $\Omega$	60.3	7 to 9 $\Omega$	50.6	11 to 14 $\Omega$

## **Trouble Shooting Guide (Continued)**

### **ADHESIVE LEVEL CONTROLS**

**(There are four types of level controls used on Union Hot Melt Coaters)**

1. One type level control used are photo switches with optic cables and sensors looking at the level of adhesive in each coating head. Two (2) photo switches are used with individual adjustments one for each of the coating heads.
2. Another type used is one sensor that is looking at the adhesive level in the top-coating head filling the top and bottom coating heads with the same level of adhesive. This type of level control uses only one (1) photo switch and a single adjustment for the two coating heads.
3. The other type level control used is a sensor that is looking at a reflector mounted on the infeed table. This type of level control does not look at the adhesive level in either of the coating heads but dispenses adhesive any time a substrate passes between the optic cable and the reflector. The amount of adhesive that is dispensed into the coating heads is controlled by speed of the pump located in the pre melt equipment. **Note:** In some applications when using a sensor looking at the reflector an adjustable off delay timers can be used to continue pumping after the substrate has past through the coater to fill the coating heads.
4. The next type used are proximity capacitive sensors

### **Level Control Adjustments and Indicators**

On one end of the photo switch there is a power cord, a red indicator light and a trim pot adjustment.

When the indicator light is “**on**” the photo switch the adhesive level is low.

When the indicator light is “**off**” the photo switch the adhesive level is correct.

### **Sensitivity Adjustment**

These sensitivity adjustments are only for when the sensor that is looking at the adhesive level in the coating heads.

The sensitivity pot has a 4 turn clutch protect adjustment to increase or decrease the level of adhesive in the coating head.

Turning the sensitivity pot clockwise will increase the power of the invisible infrared beam and will lower the level of adhesive in the coating head.

**Trouble Shooting Guide -- Adhesive Level Controls (Continued)**

Turning the sensitivity pot counterclockwise will decrease the power of the invisible infrared beam and will raise the level of adhesive in the coating head.

**Break Beam Sensitivity Adjustment**

When the sensor that is looking at the reflector mounted on the infeed table if the sensitivity pot is turned clockwise and the power is increased to high the sensor will see the substrate and will not allow the adhesive to dispense.

**Trouble Shooting Level Controls**

<b>Problem</b>	<b>Possible Cause</b>	<b>Corrective Action</b>
Level control indicator light does not turn on.	<ol style="list-style-type: none"> <li>1. Optic cable lens dirty.</li> <li>2. The sensitivity adjustment on the photo switch is set too high.</li> <li>3. Defective optic cable.</li> <li>4. Defective photo switch.</li> </ol>	<ol style="list-style-type: none"> <li>1. Wipe the end of the optic with a clean, soft cloth.</li> <li>2. Turn down the sensitivity adjustment on the photo switch.</li> <li>3. Replace optic cable.</li> <li>4. Replace photo switch.</li> </ol>
Level control indicator light does not turn off.	<ol style="list-style-type: none"> <li>1. Optic cable lens dirty.</li> <li>2. The sensitivity adjustment on the photo switch is set too low.</li> <li>3. Defective optic cable.</li> <li>4. Defective photo switch.</li> </ol>	<ol style="list-style-type: none"> <li>1. Wipe the end of the optic with a clean soft cloth.</li> <li>2. Turn up the sensitivity adjustment on the photo switch.</li> <li>3. Replace optic cable.</li> <li>4. Replace photo switch.</li> </ol>
Level control indicator light is flashing on or off.	<ol style="list-style-type: none"> <li>1. Optic cable lens dirty</li> </ol>	<ol style="list-style-type: none"> <li>1. Wipe the end of the optic with a clean soft cloth.</li> <li>2. The optic cable may need to be raised or lowered, or put on a slight angle looking at the adhesive level. The average height of the optic cable above the rolls is 3", depending on the color of the adhesive.</li> </ol>

**Trouble Shooting Guide -- Adhesive Level Controls (Continued)**

**The proximity capacitive super sensor operating parameters:**

- 1. Detection type - Capacitive
- 2. Sensing range - 2-20 mm or 0.0788" to 0.788"
- 3. Temperature range - 200° to 250°C or -328°F to -482°F

**Trouble Shooting Proximity Level Controls**

<b>Problem</b>	<b>Possible Cause</b>	<b>Corrective Action</b>
Level control indicator light on the amplifier does not turn on.	<ul style="list-style-type: none"><li>1. The sensitivity adjustment on the sensor amplifier is set too high.</li><li>2. The distance of prox sensor to the material level is too close to either of the rolls or the coating material.</li></ul>	<ul style="list-style-type: none"><li>2. Turn down the sensitivity adjustment on the sensor amplifier or move the sensor.</li></ul>
Level control indicator light does not turn off.	<ul style="list-style-type: none"><li>1. The sensitivity adjustment on the sensor amplifier is set to low.</li><li>2. The distance of prox sensor to the material level is set too faraway from the coating material.</li></ul>	<ul style="list-style-type: none"><li>1. Turn up the sensitivity adjustment on the sensor amplifier or move the sensor closer to the coating material.</li></ul>

## **Trouble Shooting Guide (Continued)**

### **Adjusting and Trouble Shooting Seal Plate Problems and Leaking**

**Note:** Running the coater with the seal plates tight, without adhesive or cleanup or coating material to lubricate the seal plates, can damage the rubber on the end of the rolls.

<b>Problem</b>	<b>Possible Cause</b>	<b>Corrective Action</b>
Seal plate adjustment		1. The correct tension is to hand tighten the nut or thumb screw and if needed one or two extra turns to apply more spring tension to the seal plate.
1. Seal plates leaking coating material.	<ol style="list-style-type: none"> <li>1. The seal plate spring tension may be too loose.</li> <li>2. You will need to check that the coating roll ends are flush with the doctor rolls, as far as left to right.</li> <li>3. Check if the seal plates are grooved deeply or damaged and have been leaking, you will need to replace the seal plates at this time.</li> <li>4. Check for damage on the rubber on the end of the roll.</li> <li>5. Check that the doctor roll is level with the coating roll.</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten the nut or thumbscrew to apply more spring tension.</li> <li>2. Loosen the setscrews in the coating or doctor roll bearings and move the roll that has shifted to the left or right; retighten the set screws.</li> <li>3. Replace the seal plates.</li> <li>4. Replace the coating roll.</li> <li>5. There are adjustments on the doctor roll bearing gibs.</li> </ol>

## **Trouble Shooting Guide (Continued)**

### **Adjusting / Trouble Shooting Doctor Roll Drive Clutch**

If the torque is too high or too low readjust torque limiter by tightening or loosening the adjusting nut as required. First straighten the tab on the lock washer before adjusting nut after adjusting the nut bend the tab on the lock washer locking the tab into place.

<b>Problem</b>	<b>Possible Cause</b>	<b>Corrective Action</b>
1. The doctor roll stops rotating.	<ol style="list-style-type: none"><li>1. Seal plates are too tight.</li><li>2. Clutch needs adjusting to apply more torque.</li></ol>	<ol style="list-style-type: none"><li>1. Loosen spring tension on seal plates.</li><li>2. Straighten the tab on the lock washer and turn the nut by hand clockwise to apply more torque.</li></ol>
1. The doctor roll drive chain jumping.	<ol style="list-style-type: none"><li>1. Clutch needs adjusting to apply less torque.</li><li>2. Spring tension needs to be increased on chain tightner, or the spring is broken or weak and needs to be replaced.</li></ol>	<ol style="list-style-type: none"><li>1. Straighten the tab on the lock washer and turn the nut counter clockwise to apply less torque.</li></ol>

## **Trouble Shooting Guide (Continued)**

### **TEMPERATURE MEASUREMENTS OF DOCTOR & COATING ROLLS & ADHESIVE**

When using hot melt roller coating equipment and using hot melt adhesives, it is important to be able to measure the adhesive temperature as well as the roll temperature, which can use different temperature measuring devices for each component.

1. If you are checking the temperature of the rolls, you should use a surface type probe. There are even some probes that have cutouts for wrapping slightly around the coating roll or the doctor roll.
2. The next style probe should be for liquid gases or semi-solid materials that may be dipped into the adhesive without flexing or bending with the rigid handle so your hands do not need to be close to the hot melt adhesive.
3. The third type is an infrared thermometer. We do not recommend using this type of device.
4. If you want to check the temperature of the adhesive in the roller coating equipment, you will need to add adhesive to the machine and let it run there for approximately 10 or 15 minutes so the adhesive would acclimate to the true temperature of the machine; not being affected by what the temperature of the adhesive being delivered. The temperature controller has offsets that can be programmed so the controller readout is the same as the adhesive temperature.
5. Our coaters only have one heating system in them so if you have a steel roll or chrome plated roll it will run at a hotter surface temperature than will a rubber covered roll. On the rubber covered roll the rubber covering acts as an insulator so the temperature will be between 30 and 50 degrees lower than the temperature of a steel roll. The temperature swing is dependent on the type of rubber compound on the roll as well as the thickness of the rubber on the roll.



680363-00 MOBILTHERM 43

MATERIAL SAFETY DATA BULLETIN

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: MOBILTHERM 43  
SUPPLIER: EXXON MOBIL CORPORATION  
3225 GALLOWS RD.  
FAIRFAX, VA 22037  
24 - Hour Health and Safety Emergency (call collect): 609-737-4411  
24 - Hour Transportation Emergency:  
CHEMTREC: 800-424-9300 202-483-7616  
LUBES AND FUELS: 281-834-3296  
Product and Technical Information:  
Lubricants and Specialties: 800-662-4525 800-443-9966  
Fuels Products: 800-947-9147  
MSDS Fax on Demand: 613-228-1467  
MSDS Internet Website: <http://emmsds.ihssolutions.com/>

2. COMPOSITION/INFORMATION ON INGREDIENTS

CHEMICAL NAMES AND SYNONYMS: BASE OIL AND ADDITIVES  
GLOBALLY REPORTABLE MSDS INGREDIENTS:  
None.  
See Section 8 for exposure limits (if applicable).

3. HAZARDS IDENTIFICATION

Under normal conditions of use, this product is not considered hazardous according to regulatory guidelines (See section 15).  
EMERGENCY OVERVIEW: Clear, Lt. Yellow Liquid. DOT ERG No. : NA  
POTENTIAL HEALTH EFFECTS: Under normal conditions of intended use, this product does not pose a risk to health. Excessive exposure may result in eye, skin or respiratory irritation.  
For further health effects/toxicological data, see Section 11.

#### 4. FIRST AID MEASURES

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EYE CONTACT: Flush thoroughly with water. If irritation occurs, call a physician.

SKIN CONTACT: Wash contact areas with soap and water. Remove and clean oil soaked clothing daily and wash affected area. (See Section 16 - Injection Injury)

INHALATION: Not expected to be a problem. However, if respiratory irritation, dizziness, nausea, or unconsciousness occurs due to excessive vapor or mist exposure, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or mouth-to-mouth resuscitation.

INGESTION: Not expected to be a problem. Seek medical attention if discomfort occurs. Do not induce vomiting.

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#### 5. FIRE-FIGHTING MEASURES

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EXTINGUISHING MEDIA: Carbon dioxide, foam, dry chemical and water fog.

SPECIAL FIRE FIGHTING PROCEDURES: Water or foam may cause frothing.

Use water to keep fire exposed containers cool. Water spray may be used to flush spills away from exposure. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply.

SPECIAL PROTECTIVE EQUIPMENT: For fires in enclosed areas, fire fighters must use self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARDS: None.

COMBUSTION PRODUCTS: Fumes, smoke, carbon monoxide, sulfur oxides, aldehydes and other decomposition products, in the case of incomplete combustion.

Flash Point C(F): > 200(392) (ASTM D-92).

Flammable Limits (approx.% vol.in air) - LEL: 0.9%, UEL: 7.0%

NFPA HAZARD ID: Health: 0, Flammability: 1, Reactivity: 0

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#### 6. ACCIDENTAL RELEASE MEASURES

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NOTIFICATION PROCEDURES: Report spills/releases as required to appropriate authorities. U.S. Coast Guard and EPA regulations require immediate reporting of spills/releases that could reach any waterway including intermittent dry creeks. Report spill/release to Coast Guard National Response Center toll free number (800)424-8802. In case of accident or road spill notify CHEMTREC (800) 424-9300.

PROCEDURES IF MATERIAL IS RELEASED OR SPILLED:

LAND SPILL: Shut off source taking normal safety precautions. Take measures to minimize the effects on ground water. Recover by pumping or contain spilled material with sand or other suitable absorbent and remove mechanically into containers. If necessary, dispose of adsorbed residues as directed in Section 13.

WATER SPILL: Confine the spill immediately with booms. Warn other ships in the vicinity. Notify port and other relevant authorities.

Remove from the surface by skimming or with suitable absorbents. If permitted by regulatory authorities the use of suitable dispersants should be considered where recommended in local oil spill procedures.

ENVIRONMENTAL PRECAUTIONS: Prevent material from entering sewers, water sources or low lying areas; advise the relevant authorities if it has, or if it contaminates soil/vegetation.

PERSONAL PRECAUTIONS: See Section 8

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## 7. HANDLING AND STORAGE

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HANDLING: No special precautions are necessary beyond normal good hygiene practices. See Section 8 for additional personal protection advice when handling this product.

STORAGE: Keep containers closed when not in use. Do not store in open or unlabelled containers. Store away from strong oxidizing agents and combustible materials. Do not store near heat, sparks, flame or strong oxidants.

SPECIAL PRECAUTIONS: Prevent small spills and leakages to avoid slip hazard.

EMPTY CONTAINER WARNING: Empty containers retain residue (liquid and/or vapor) and can be dangerous. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Do not attempt to refill or clean container since residue is difficult to remove. Empty drums should be completely drained, properly bunged and promptly returned to a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

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## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

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### OCCUPATIONAL EXPOSURE LIMITS:

When mists/aerosols can occur, the following are recommended: 5 mg/m<sup>3</sup> (as oil mist) - ACGIH Threshold Limit Value (TLV), 10 mg/m<sup>3</sup> (as oil mist) - ACGIH Short Term Exposure Limit (STEL), 5 mg/m<sup>3</sup> (as oil mist) - OSHA Permissible Exposure Limit (PEL)

VENTILATION: If mists are generated, use adequate ventilation, local exhaust or enclosures to control below exposure limits.

RESPIRATORY PROTECTION: If mists are generated, and/or when ventilation is not adequate, wear approved respirator.

EYE PROTECTION: If eye contact is likely, safety glasses with side shields or chemical type goggles should be worn.

SKIN PROTECTION: Not normally required. When splashing or liquid contact can occur frequently, wear oil resistant gloves and/or other protective clothing. Good personal hygiene practices should always be followed.