

Z8 Rotary Dryer

Operations Manual



- *Introduction*
- *Safety Guidelines*
- *Equipment Description and Operation*
- *Installation*
- *Operating Instructions*
- *Lubrication and Maintenance*



Introduction

This manual contains specifications, operating instructions, maintenance and service procedures, and parts listings for the ECPI Z8 Rotary Drum Dryer System.

The service procedures in this manual describe regular maintenance, trouble shooting, disassembly, and assembly of selected components. Contact your authorized service representative or the component manufacturer before performing service procedures that are not described in this manual.

Carefully read the instructions and safety precautions given in this manual. Do not service this equipment until you have read this manual thoroughly.

At the time of writing, this manual was completely up to date. However, due to continual design improvement, some descriptions and/or illustrations in this manual could vary slightly from the equipment delivered to you. If you have questions regarding safety, operation, or service of this machine, please contact:

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Safety Guidelines

Safety is your responsibility and ours. You are cautioned to read and understand these safety guidelines before operating, or performing maintenance on, the equipment described in this manual.

To protect your employees, follow the training suggestions, maintenance schedules and procedures, and the operating safeguards described in this manual. The operation, safety, and performance of the equipment may be materially impaired if:

The equipment has not been operated in conformity with the instructions in this manual; or

Repairs, alterations, or replacements not provided for in this manual have been made without approval of the Earth Care Products, Inc.

These safety guidelines have been prepared to help equipment operators and maintenance personnel practice good safety procedures. These guidelines should be used as a supplement to other safety precautions and warnings provided in the following:

- All other manuals pertaining to the equipment, auxiliary equipment, and controls - these include manuals or other publications supplied by the manufacturers of the component parts of the equipment.
- Federal and State Safety Laws and Regulations. See the latest edition of the Occupational Safety and Health Act (OSHA) available from the Department of Labor, Washington, DC.
- Local safety rules, codes and facility safety procedures.

Warning Signs and Labels

Make certain that all warning signs and labels are kept clean and visible. All lost or damaged warning signs and labels must be replaced immediately. Replacement warning signs and labels are available from Earth Care Products.

Safety Alert Symbol



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

The safety alert symbol is used in this manual. It is also used on safety warning signs and labels that may be attached to the equipment. This symbol will always be used in combination with a signal word, DANGER or WARNING which indicates the level of severity of the potential hazard as follows:

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 death or serious injury.

Operating Safety

This equipment should be operated only by qualified persons, instructed in safety and all equipment functions. Every person operating this equipment and every person working in the area of this equipment must be trained to understand and use your facility's Energy Control (Lockout/Tagout) Procedures. Refresher training should be done periodically.

Do not operate the equipment with safety guards, shields, covers, and other protective devices disconnected, removed, or out of place. If a guard, shield, or cover, or other protection (i.e., electrical interlock or alarm) is removed for maintenance or repairs, install it properly before connecting the power supply to the equipment.

Maintenance Safety



Assign only trained, qualified service or maintenance personnel to perform maintenance and repair work on this equipment.

Do not perform maintenance on this equipment until you read and understand all the safety instructions. Follow your facility's Energy Control (Lockout/Tagout) Procedures when you perform maintenance and repair work on this equipment.

When you perform maintenance or repair work inside a drum or other vessel and follow your facility's procedures for working in Confined Spaces.

Performing maintenance according to recommended schedules for the equipment as set forth in this manual is a further safeguard for enhanced operator and equipment safety.

After performing maintenance, install all guards, shields, covers, and other safety devices. Install all fasteners provided for attaching these devices to prevent accidental or unauthorized removal. Make sure all guards, shields, covers, and other protective devices (i.e., electrical interlock or alarm) have been installed before removing lockout protection. Be sure all safety devices are in place when the equipment is operating.

Equipment Description

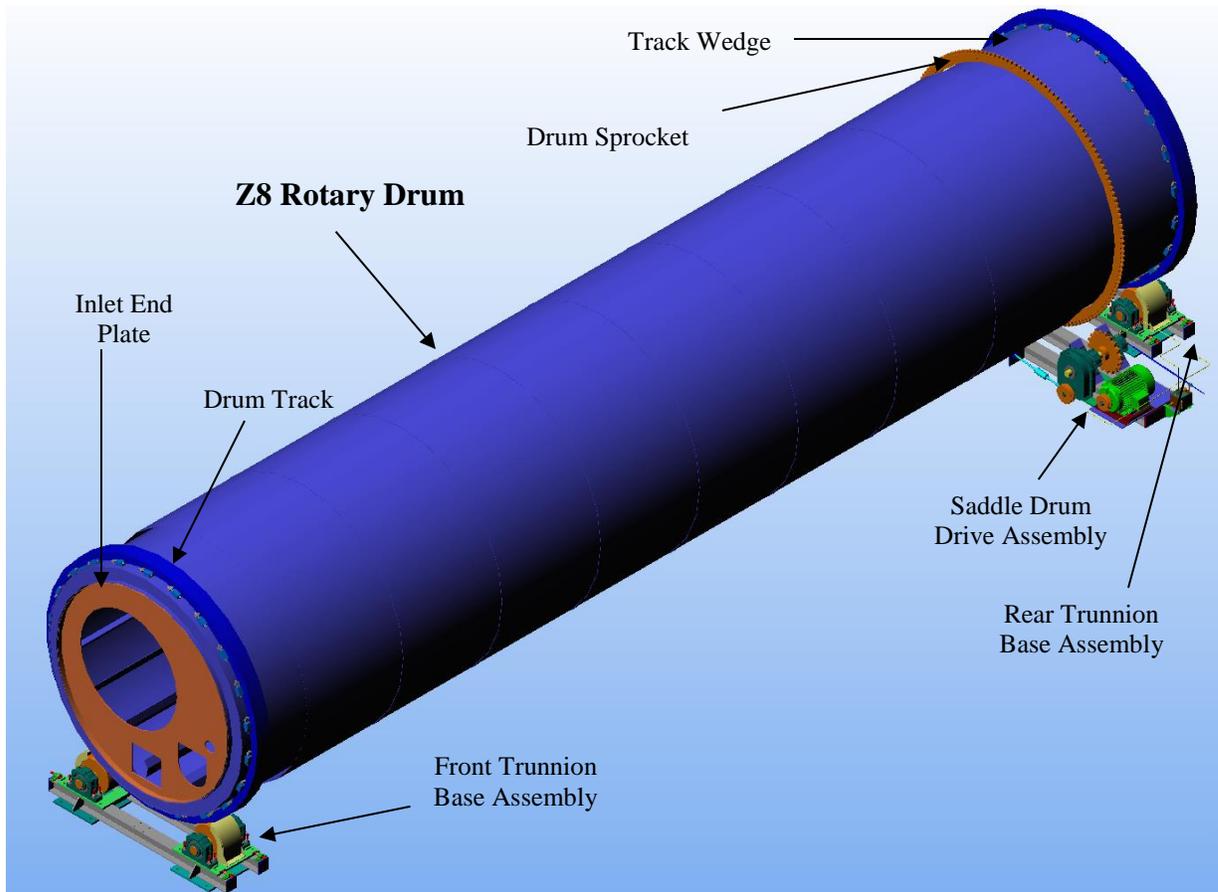


Figure 1 Rotary Dryer System (Drive Chain and Drive belts not shown)

The Z8 Rotary Dryer System consists of the Z8 Rotary Drum, Saddle Drum Drive Assembly, Front and Rear Trunnion Base Assembly, Drum Track, Drum Sprocket, Inlet End Plate, Dryer Discharge Plate and the Track Wedges.

The Z8 Rotary Drum consists of an outer tube, two intermediate tubes and two center tubes. All the tubes are concentric with each other. The outer tube extends over the entire length of the dryer. The first center tube is placed within the first intermediate tube to a specified length. This assembly is placed within the outer tube to a specified length. This whole assembly makes up Zones 1 to 4.

A similar intermediate-center tube assembly is placed a specified distance from the first intermediate-center tube assembly. The second intermediate-center tube assemblies make up Zones 5-8. Thus, the dryer has 8 Zones and hence the name Z8.

Immediately past the inlet, the dryer is provided with spiral flights (lifters) on its inside surface. This is the place where the material fed into the dryer makes the first contact with the dryer. Straight flightings (lifters) are provided across length of the dryer. These flights create the necessary turbulence within the dryer which is important for low temperature drying.

Operation

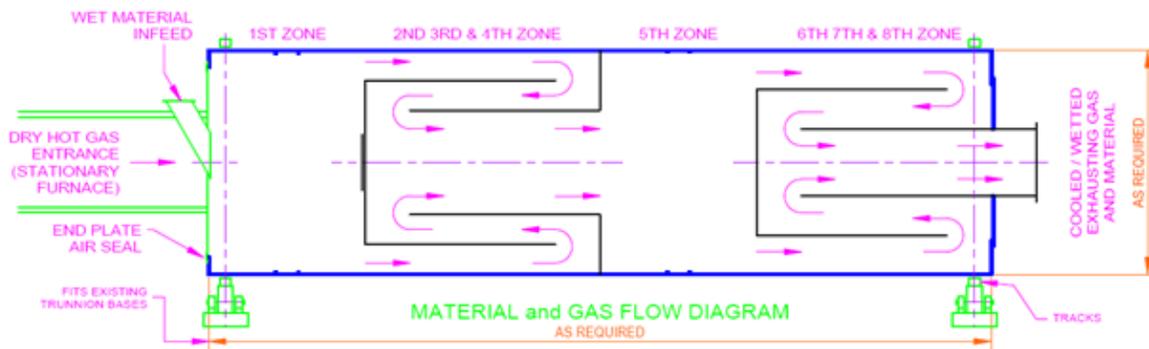


Figure 2

Hot air from the heat source is induced into the dryer. Wet material is fed into the dryer by means of a mechanical feeder. The airflow is regulated to desired ACFM values to ensure the following, 1. The velocity of air is above the saltation velocity of the material exiting the dryer, 2. The material in the dryer does not exceed dry bulb temperature. 3. The residence time of the particles is that required to achieve the desired final material moisture content.

Heat is transferred to the wet material through convection from hot gases passing through the drum. The lifting flights carry material up and shower it at right angles to the gas flow. This falling material is impinged by the induced hot air which causes turbulence and eddy currents. These eddy currents are carried across the dryer as the hot air conveys the material through 8 zones to the discharge of the dryer. The material and gas streams through the drum are at their lowest velocity and highest temperature at the drum inlet, increasing velocity and decreasing temperature as they pass through the drum. This allows for the greatest evaporation to take place near the inlet side of the drum. Free water at the surface of the material cools the gases by evaporative cooling. This provides classification of particle sizes and causes small particles to accelerate through the dryer thus not volatilizing. It also prevents material build up or any fouling of any surfaces inside the drum dryer. The material and gases are at the highest velocity as they enter the discharge duct. This high discharge velocity is maintained well above the conveying velocity.

The material flow follows a serpentine path as it is made to change directions 4 times along its travel from the inlet to the discharge of the dryer. This design of dryer not only

increases the residence time of the materials but also creates adequate turbulence thus ensuring more uniform drying as compared to a conventional dryer of the same size.



Inlet End Plate

The Dryer Furnace and the material infeed conveyor are connected to the Z8 Rotary Drum by means of the Inlet End Plate. The Inlet End Plate is tack welded to the rotary drum at the time of shipping. *Therefore, make sure all the tack welds are removed before rotating the drum. Failure to do so will cause serious damage to the equipment.*

Man-Access Door

Figure 3

The inlet plate is normally supplied with an infeed chute or conveyor connection, access door, sight port and water deluge connections.

It is the Buyer's responsibility to correctly connect the water deluge to an operating water valve, manual or automatic, to spray the drum with water when/if the drum reaches a high temperature alarm.

A high temperature seal is attached to the inlet plate with bolts and springs that allow the material to seal against the face of the rotary drum endplate.



Figure 4

Inlet Seal Assembly

Dryer Discharge Plate

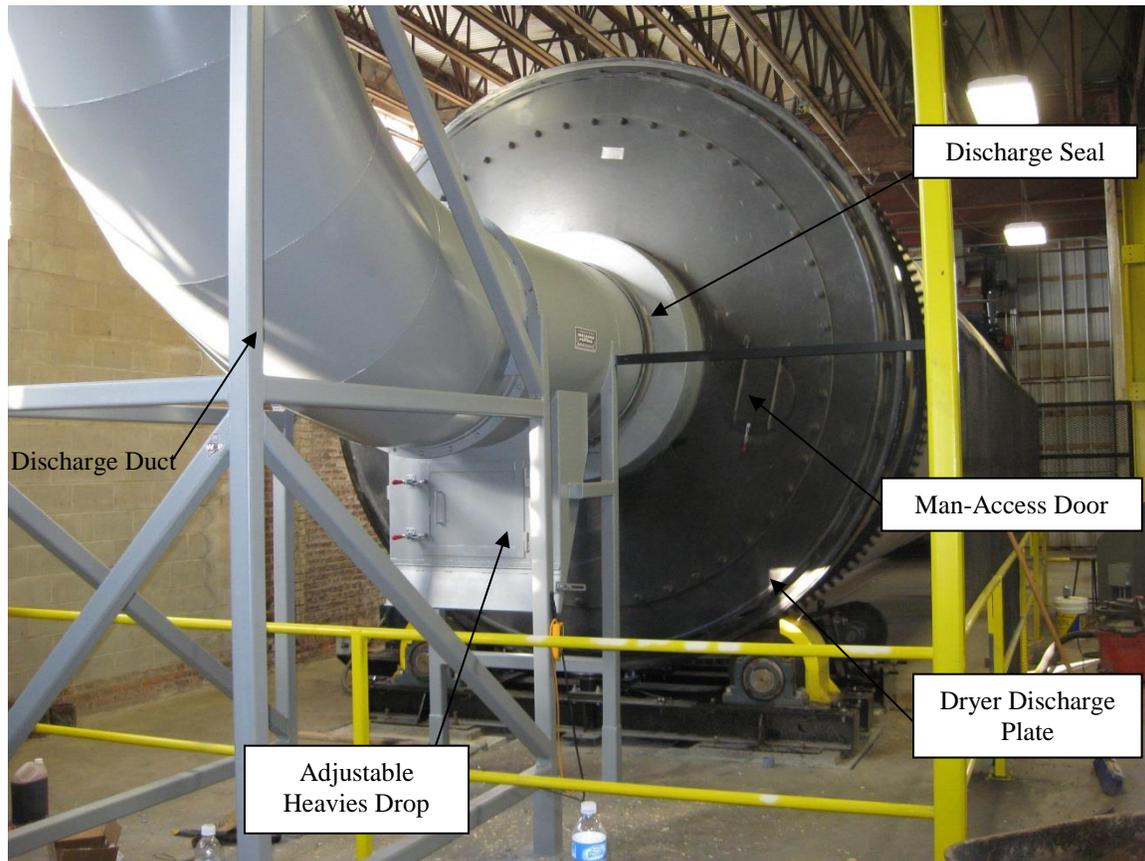


Figure 5

The Dryer Discharge Plate is bolted to the discharge end of the dryer. **The seal requires a gap of approximately 1 inch between the dryer discharge and discharge duct.** It is covered by the dryer discharge seal. The seal is held in place by two band clamps with adjustment screws, both are mounted on the discharge duct, securing the seal while the drum duct rotates inside of the seal.

The adjustable Heavies Drop is designed to allow the dried material to pass through the drop zone, while keeping the opening in the bottom large enough for most heavy rocks, metal or foreign material to drop out of the trap. Closing the door all the way will allow material to build up in the heavies drop and opening the door all the way allows too much air to bypass the drum.

Installation

Initial Start-Up

Inspect each piece of machinery to insure proper safety guards are installed. Also check that tools, scaffolding, etc., are clear of machinery.

Inspect each piece of machinery, motors, gear drives, bearings, etc., for proper lubrication and assembly. All speed reducers and other components requiring oil for lubrication are shipped without oil. Fill to proper level before operating.

Adjust all chain and belt drives for proper alignment and tension while running under no loads. Misalignment will cause unnecessary wear on belts, sheaves, and chains.

To prevent spalling and excess wear, a trunnion lubricating system has been supplied with the system. All warranties are null and void if proper lubrication is not provided on drum wheels, tracks and drive chain.

Remove all chocks between the trunnion wheels and drum tracks. Clean foreign material from the drum tracks and trunnion wheels before rotating the drum.

Drum Start-Up and Adjustment

Rotate the drum with the drive and observe action of the seals and gaskets for concentric, easy-running fit. Observe rotation of drum and see that the seals lap against the direction of drum rotation.

Check the drum tracks for equal contact (minimum of 80%) on all four trunnion wheels. After lubricating the track and heating the drum to its operating temperature, the drum should be free to float axially on the trunnion wheels between the thrust wheels (approximately 1/2 inch total).

Check the thrust of the drum between the thrust wheels. See the trunnion alignment details to make proper adjustment for a free floating drum.

Adjust the drum drive chain for a fairly tight condition for proper operation.

Operating Instructions

Normal Start-Up Procedure

- Start the downstream material conveying equipment in accordance with the control sequence engineered for the system.
- Start the rotary airlock at material discharge.
- Start the dryer induced draft fan system.
- Start the drum drive. The drum drive start-up is not in the interlock system and can be started at any time.
- Start the Burner System. Refer to the Burner manual for start-up and operation of the Burner system.
- The drum discharge operating temperature will be determined by several things:
 - The moisture content and volume of incoming material to be dried.
 - The desired moisture content of the dried material.
 - The air velocity, elevation, ambient temperature and humidity, etc.
- The furnace, dryer, and air system should run for about 30 minutes from any cold start-up at the desired discharge operating temperature before wet material is started through the system. To start feeding wet material:
- Start the Rotary Airlock at the material infeed (if supplied).
- Start the Infeed Conveying system. On startup, the rate of feed of incoming material should be reduced to about 1/2 of operating capacity until the system has leveled out. The feed rate may then be increased over a 10 minute period to operating capacity. This will warm up the equipment and not overload the dryer.
- Feedstock and Product samples should be tested for their moisture content at regular intervals and the drum outlet temperature varied accordingly to get desired moisture in finished product. As long as the moisture content and the rate of feed do not vary, the dryer should operate with very little changes made to the drum outlet temperature.

Normal Shutdown Procedure

- Start lowering the rate of feed to the dryer from operating capacity down to about 1/2 capacity. Wait five to ten minutes until the drum inlet temperature has lowered from operating temperature.
- Stop infeed devices.
- Let dryer equipment run until all dried material is through and out of the dryer. If there is an increase in drum outlet temperature (50° F above set point), drop the discharge temperature control setting by 20 to 50° F. (DO NOT AUTOMATICALLY DELUGE THE DRUM WITH WATER/STEAM ON MATERIAL SHUTDOWN. THIS WILL CAUSE UNDUE STRESS TO THE DRUM.)
- Shut off the burner if the dryer is going to be shut down for any length of time. If wet material is going to be re-started through the dryer in a short time allow the burner run on low fire at the operating temperature.
- Let the drum and the dryer induced draft fan system run until all the material has cleared out of the system and the dryer temperature has lowered to about 120° F or ambient temperature.
- Stop the Dryer induced-draft Fan.
- Stop the Drum Drive.
- Stop the Discharge Rotary Airlock.
- Complete shut-down.

Recommended Fire Shutdown Procedure

- If fire system is actuated by the high temperature limit or by manual emergency button, the following sequences of events occur:
- Dry material aborts.
- Solenoids energize to water or steam nozzles in drum inlet plate, drum discharge duct, and cyclone and ducting areas.
- Material infeed stops.
- Burner shuts down.
- The dryer induced air system remains on.
- The dryer drum continues to rotate.
- After the fire is out and the dryer temperature is below the high limit setting, the complete system should be cleaned out and visually inspected for any damage.
- Ensure the fire solenoids are de-energized.
- Drain all excess water from the dryer drum and discharge ducting area.

- Check the discharge duct to be sure there is no material build-up.
- Try to determine the cause of the fire.
- Check temperature limits.
- Check the cyclone discharge and ducting for any signs of plugging.
- Check the gas pressure switches.
- Restart the system and bring it up to operating temperature as in normal startup without starting infeed.
- Let the dryer operate until all material is cleaned out and moisture has dried up in the drum, ducting, and collectors.
- Restart material as in normal startup.

CAUTION:

In case of fire in the rotating drum, allow the automatic shutdown system to extinguish the fire. To avoid equipment damage:

Do not stop drum rotation.

Use steam or water fog to extinguish fire.

Do not spray a solid water stream on or in the furnace or refractory.

Failure to follow this instruction can result in distortion of the drum or damage to the furnace or refractory.

Troubleshooting Chart

TROUBLE	POSSIBLE CAUSE	REMEDY
Sudden decrease in output of dried product.	Feeder or conveyor jammed or stopped.	Clean and restart.
	Lack of air.	Check for loose fan wheel or slipping belts; build-up in duct causing back pressure.
	Air ducting, collector or drum plugged.	Stop drum and clean out drum and air system. See "Normal Shut-down."
Finished product too wet	Outlet temperature set too low.	Increase temperature control setting.
	Overfeeding.	Reduce wet feed rate.
	Insufficient fuel or not enough heat for required drying.	Check for (1) obstructions in flow at fuel source; (2) fuel valve not opening completely.
	Dryer rotating too fast.	Lower drum rpm.
	Excessive airflow.	Check and lower dryer airflow.
Finished product too dry.	Outlet temperature set too high.	Decrease temperature control setting.
Drum discharge temperature higher than expected for required moisture content.	Air leaks at inlet or discharge seals.	Eliminate leaks. All air must come through furnace dampers.
	Feed moisture content is higher than anticipated.	Check upstream feed devices for calibration or other problems.
	Excessive Airflow	Check and lower dryer airflow.
	Dryer rotating too fast.	Lower drum rpm.
	Material throughput through drum is too low.	Increase dryer material infeed rates to maximize system operation and efficiency.
Drum discharge operating temperature varies more than anticipated.	Non-uniform wet feed rate.	Feed more uniformly.
	Non-uniform airflow rate.	Check fan, duct, collector and airlock for leaks, blockage or other problems.
	Non-uniform wet product.	Minimize non-uniformity by pre-mixing wet feed material.
Wet particles in finished product.	Improper preparation of wet product.	Reduce particle size, better feed mixing/preparation.
Too much product loss out of collector stack.	Collector, hopper, or conveyor system material backing up.	Check airlock for rotation and leakage. Check exhaust fan airflow. Check for material plugs.
	Exhaust airflow too low.	Check exhaust fan airflow for leaks.
	Leaking airlock vanes.	Check airlock rotor tips for possible wear or loss. Replace if necessary.
Too much product collecting in rock trap.	Heavies drop closed too much.	Open heavies drop gate to overcome condition.
	Airflow too low creating low duct air velocity.	Increase fan speed to increase airflow rate, or limit downstream leakage.
Drum drive chain disengages from sprockets or climbs teeth.	Sprocket misalignment.	Re-align drive with drum sprocket.
	Loose chain.	Adjust chain tension.
	Worn chain or sprockets.	Replace as required.
Force of drum on thrust wheels is too high.	Drum and trunnions not aligned	Check leveling and correct as required. See "Maintenance and Adjustment."
	Misaligned drive sprocket.	Check and move sprocket alignment.
Uneven track or trunnion wear	Drum and trunnions not aligned	Check leveling and correct as required. See "Maintenance and Adjustment."
	Trunnions not level	Check level and shim under bearings.
Tracks are slipping around drum shell	Wedges or bolts are loose	Tighten wedges. See Maintenance and Adjustment. DO NOT OVERTIGHTEN!!!

Figure 6

Lubrication and Maintenance

Introduction

This chapter summarizes lubrication and maintenance procedures which should be performed according to a regular schedule. The figures in this chapter provide a brief description of each procedure. In some cases, the procedure is described in more detail elsewhere in this manual. When this is the case, the procedure in the figure refers to the section containing the detailed description. Refer to the manufacturer's literature for service details on components such as the shaft coupling.

Before performing any of the procedures described here, review the safety notes in Chapter 1 of this manual. In addition, be sure to follow all safety procedures in effect at your facility. These include, but are not limited to, lockout/tagout procedures and procedures for working in confined spaces.

Personal Safety



WARNING:

Follow your facility's Energy Control (Lockout/Tagout) Procedures before performing maintenance, or repair work on this equipment. This should include the following steps:

Empty the Dryer.

Disconnect electrical power to the Dryer and lock it.

Shut off the fuel supply to the furnace and lock it

Failure to follow this instruction can result in serious personal injury.

Before performing lubrication and maintenance service on the Dryer, discharge the contents of the Dryer and shut it down according to normal operating procedures. Turn off and lock out the electrical power to the Dryer and to other connected equipment, if any, to prevent starting. In addition, turn off and lock out power to any feed and discharge equipment connected to the Dryer. See WARNING.

Wear suitable safety equipment when performing service on this equipment (eye protection, protective head gear, etc.). Use a suitable lifting device to lift heavy components.

Lubrication

Recommended Lubricants

Figure 7 lists recommended lubricants to use for each Dryer component. Equipment must be operated with the following lubrication specifications and schedules to ensure a long and properly operating system. Failure to do so will result in premature equipment

wear, failure and warranty nullification. Please refer to the manufacturer’s recommendations in the manufacturers section of this manual. The lubricant supplier should certify equivalency to the reference products listed in this manual.

COMPONENT	LUBRICANT SPECIFICATION
Drum Drive Reducer:	150 ISO Synthetic normal ambient 68 ISO severe cold weather
Chain Drive:	100 ISO, 85W Gear Oil or SAE 30 normal, 68, 80W or SAE 20 cold
Drum Tracks and Trunnion Wheels:	100 ISO, 85W Gear Oil or SAE 30 normal, 68, 80W or SAE 20 cold
Trunnion Wheel Bearings	Shell Alvania #2
Thrust Wheel Bearings	NLGI No. 2 vehicle grade grease
Damper Bearings	Dow Corning Molykote 44
Airlock and Conveyor Bearings	Shell Alvania #2
Fan Bearings	Shell Alvania #2
Drive units for airlock and conveyors	150 ISO Synthetic normal ambient 68 ISO severe cold weather

Figure 7: Lubricant Specifications

An equivalent 150 ISO synthetic lubricant would be Mobil SHC 629, and for 68 ISO, the equivalent would be Mobil SHC 626 for the gear boxes.

Lubrication Schedule & Procedures

Figure 8 shows the lubrication schedule for the Dryer. The chart also describes the procedure for lubricating each of the components. Do not apply grease to bearings more than indicated by the manufacturer’s specifications. Excess grease causes more failures in bearings than too little grease.

COMPONENT	INTERVAL	PROCEDURE
Drum Tracks	Hourly	Apply the specified lubricant uniformly on the trunnion wheels while the drum is in motion, as required. Automatic oilers, if supplied, should be set at around one drop per minute, or just enough to keep surface wet with oil.
Drum Drive	Hourly	Drum drive chain should be kept lightly lubricated. Oilers should be set at around one drop per every two minutes, or just to keep the surface wet.
Trunnion Wheel Bearings	Weekly	Apply grease per manufacturer’s specifications.
Thrust Wheel Bearings	Monthly	Apply grease per manufacturer’s specifications.
Fan Bearings	Weekly	Apply grease per manufacturer’s specifications.
Airlock Bearings	Weekly	Apply grease per manufacturer’s specifications.
Screw Conveyor Bearings	Weekly	Apply grease per manufacturer’s specifications.
Damper Shaft Bearings	Weekly	Apply grease per manufacturer’s specifications. Do not lubricate sleeve type high temperature bearings.

Figure 8: Lubrication Schedule —Rotary Dryer System

Maintenance Schedule

The maintenance schedule summarizes regular maintenance procedures. A small amount of time spent performing recommended maintenance procedures described in this manual will minimize unexpected failures, and assure long life and optimum performance of the equipment.

COMPONENT	INTERVAL	MAINTENENACE PROCEDURE
Rotary Drum	Weekly	Check inside drum for build-up of material. Build-up is most likely to be in the end of the first drying pass. Clean off excess build-up to avoid possible volatilization of the over-dried materials.
		Check the air pressure drop across the drum. The static air pressure difference between the inlet and discharge can indicate if any airflow issues are present.
	Monthly	Check the dryer inlet seals for alignment and wear. Tighten springs and adjust leaf seals as necessary.
	6 Months	Check weld rings, gussets, welds, etc., on center and intermediate tubes. This is very important, especially if any fires have occurred. Check all internal support gussets and rings for cracks in the welds or parent metal. Repair minor cracks directly by welding or by use of splice/patch plates. If damage is extensive, it may be necessary to replace the weld rings and gussets. It is necessary to enter the inner cylinders to do a complete check. More frequent inspections may be necessary if operating conditions include continuous duty, temperatures above normal operating and above normal inert materials.
Drum Tracks and Wedges	Weekly	Check drum track wedges to ensure tightness of the track and to prevent track slippage. Tighten wedge bolts as needed.
		Check the face of the tracks for consistent wear patterns and good contact between tracks and wheels.
		Check the face of the tracks for proper lubrication. Adjust oil drip on lubricator as required.
Drum Sprocket	Monthly	Check the drum sprocket for wear from the pulling of the drive chain. Check bolts to be sure none have come loose.
Drum Trunnion Bases	Daily	Drum should float freely between thrust wheels. Adjust if drum tire constantly rides on one thrust wheel. Refer to the "Trunnion Adjustment Procedure."
		Check for trunnion wheel shaft slippage. If the wheel has slipped in the bearing lock rings, lift drum to relieve weight and reset shaft to center and retighten and countersink locking set screws into shaft.
	Weekly	Check trunnion wheels for wear. Replace or re-machine drum trunnion wheels as required to maintain smooth surface.
		Check bearings for lubrication and temperature. Lubricate and replace as needed.
		Check thrust wheels for wear. Replace assembly as needed.
	3 Months	Check all bolts to ensure that they are tight.
Saddle Drive	Weekly	Check all sprockets, chains, bearings, drives, couplings, etc. for alignment, tension, wear. Adjust or replace as required.
		Check tension of drive chain to drum sprocket and guide plate. Use adjustment bolts on drive idler end to properly tighten chain.
	Monthly	Check gear box for oil. Check level per drive manual instructions.
		Check drive belts for tension and wear. Replace entire set as needed.
		Check bearings for lubrication and temperature. Lubricate and replace as needed.
		Check drive chain and sprockets. If chain is worn out, replace the entire chain.
	Check drive base bolts to ensure all are tightened properly.	
	3 Months	Check drive base welds to structural channel for cracks or excess wear to base.
Lubricator	Daily	Check to be sure the lubricator pumping unit is working properly. Check the drip units and the flexible hose to be sure no plugging or leaking has occurred.
Furnace/Refractory Lined Ducting	Monthly	Check furnace steel to be sure no overheating or cracks, hot gas leakage is occurring.

		Inspect hot gas turbulator for signs of wear or change in steel integrity caused by vibration, overheating, or slippage. Inspect and clean all thermocouples as required.
	6 Months	Inspect thoroughly. Completely remove badly spalled or deteriorated refractory. Replace following original manufacturer's recommendations. Remove all foreign material and dust from the furnace.
Cyclone Collectors	Hourly	Collector hoppers and collectors should be visually inspected for build up of material. Hoppers are normally supplied with level detection devices for automatic checking of material build-up.
	Weekly	Check the air pressure drop across the drum. The static air pressure difference between the inlet and discharge can indicate if any airflow issues are present.
	Monthly	Check the cyclone inlet sections and cone sections for wear. Make sure material has not work holes in these sections.
Heavies Drop	Hourly	Check discharge of Heavies Drop. Make sure opening is at the proper setting. Make sure no inert materials are hanging up in trap opening. Prevent inert build-up under the Heavies Drop at all times.
	Daily	Check dryer discharge seal for alignment. Check to see that the drum discharge duct has not worn a hole in the seal. Tighten bands as necessary.
	Weekly	Check diaphragm plug switch to be sure it is clear and not blocked and is working properly.
Natural Gas Burner System	Monthly	Inspect flame scanners. Check for proper purge air. Check for obstructions in scanner sighting ports. Clean as needed.
		Check control motors and linkage for slippage. Check movement to be sure they are free and lubricated.
		Check Burner Fan to ensure blower is operating properly.
		Check flame shape and color. Make adjustments to fuel/air ratio per burner manual.
Screw Conveyors	Weekly	Visually inspect screw conveyors for wear on troughs, drive tension and operation, reducer and motor operation.
		Check drive belts for wear, tension, and alignment. Adjust tension. Check bearings for wear, alignment and lubrication.
	Monthly	Check gear box for oil. Check level per drive manual instructions.
Rotary Airlocks	Weekly	Check drive belts for wear, tension, and alignment. Adjust tension. Check bearings for wear, alignment and lubrication.
	Monthly	Check airlock rotor. Shear knife types have a shear knife blade to check and adjust. Flex tip type units are checked for wear of the flexible belting for air leakage.
		Check gear box for oil. Check level per drive manual instructions.
Fan Units	Weekly	Check bearings for wear, alignment and lubrication.
	Monthly	Check alignment of fan unit and connecting ducts. Check unit for excess vibration.
		Check fan drive belts for wear, tension, and alignment. Adjust belts for proper tension.
		Remove buildup from impeller. Replace impeller if worn.
6 Months	Check fan bolts and anchor bolts to ensure that they are tight.	
Process Gas Dampers	Monthly	Inspect damper actuator motors, linkage and control arms to ensure no slippage has occurred.
		Make sure dampers move freely. Inspect damper blades and shaft for warping. Replace severely warped airfoil blades and shafts.
		Inspect damper shaft bearings.
Material Handling Duct /Transitions /Elbows	Monthly	Inspect ducting flanges and connections for air and material leakage. Silicone sealant may need to be replaced.
		Inspect outside of duct for wear or build-up. Clean as needed.
	3 Months	Inspect elbows for wear and build-up of material.

Figure 9 Maintenance Schedule —Rotary Dryer System

Maintenance Procedures to change trunnion wheel/shaft or bearing

At times, it will become necessary to lift the drum off of the trunnion wheels in order to do maintenance, either replacing a trunnion wheel and shaft, or to replace a trunnion wheel bearing. See ECP Drawing list for the drawing showing the procedures necessary to lift the rotary drum with safety precautions in place in order to do this maintenance work. All safety precautions should be followed.

Z8 Rotary Drum Track Maintenance Procedures



!WARNING! Follow your facility's Energy Control (Lockout/Tagout) Procedures. Turn off the local power disconnect switch and lock it before removing area guards or performing any inspection or adjustment of the track components. Failure to follow this instruction can result in serious personal injury.

The rotary dryer track utilizes a wedge system to hold the track to the drum shell. The design utilizes a split bottom wedge welded to the drum shell hold the track in a lateral position and provide the angle for the top wedge installation. The top wedge is held in position with through bolts and a wedge retainer bar. The design of the track and wedge system is such that some slipping of the track around the drum shell may occur. The movement should be limited to a few inches of track movement around the drum per any operating day while the drum is in a hot operating condition. If the drum is rotated for an extended period with no heat applied, the track slippage may be more.

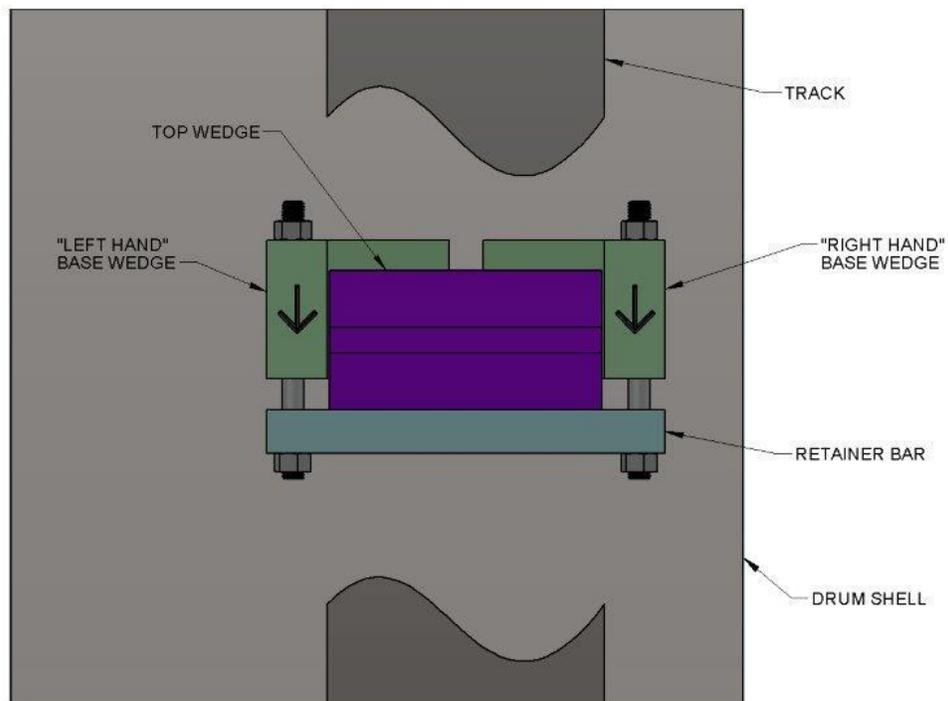


Figure 10 Top View of Wedge and Track

Adjustment bolts threaded through the track blocks hold the top wedge tight against the inside face of the track. The bolts are factory tightened. At regular intervals, the track should be checked for slippage and tightened if necessary.

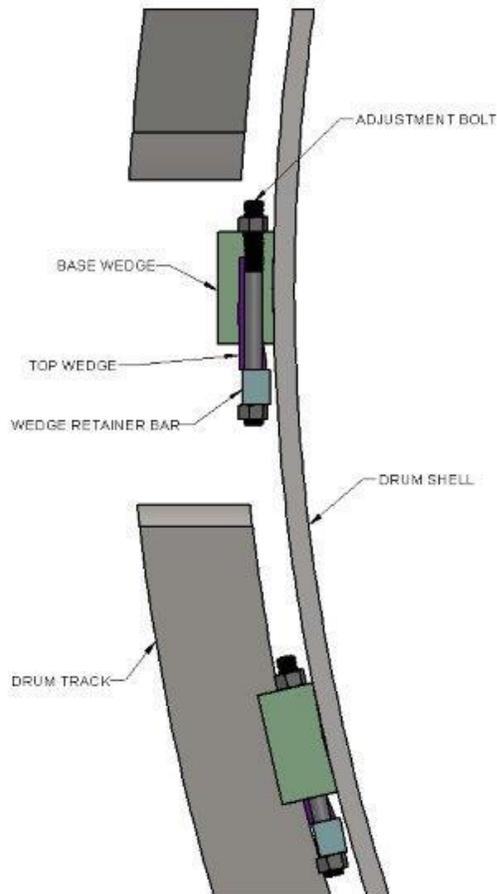


Figure 61 End View of Wedges

Track tightening procedure.

1. Use a wrench to tighten nuts.
2. Begin at an easy to reach wedge. Tighten several wedges on each side of the drum, then rotate the drum until more wedges can be reached until the entire set of wedges are tightened.
3. Tighten the bolts on each wedge as a unit. Do not allow one of the bolts to be adjusted in further than the other. This will bring the wedge out of square with the track.

DO NOT WELD ANYTHING TO THE TRACK AT ANY TIME.

Check the tracks after several days of operation. If the track is still moving more several inches per day, repeat the tightening procedure. If the track continues to move excessively after 2 or 3 tightening procedures, call Earth Care Products for analysis.

The arrow on the bottom wedge indicates the rotation of the rotary drum.

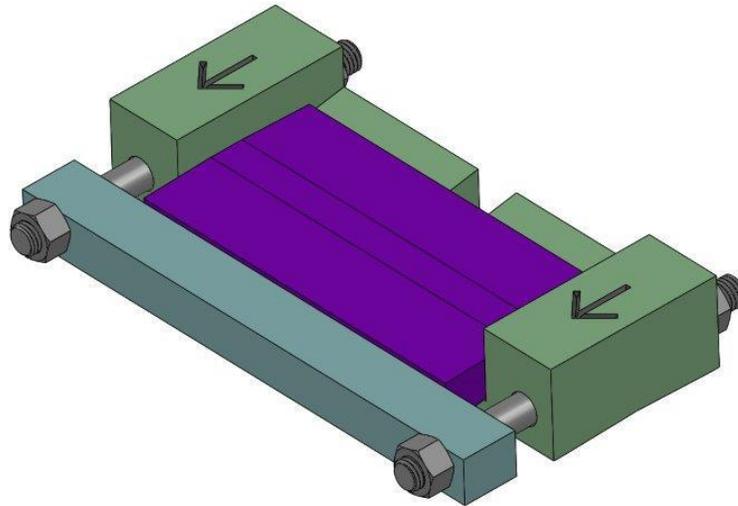


Figure 72 Isometric View