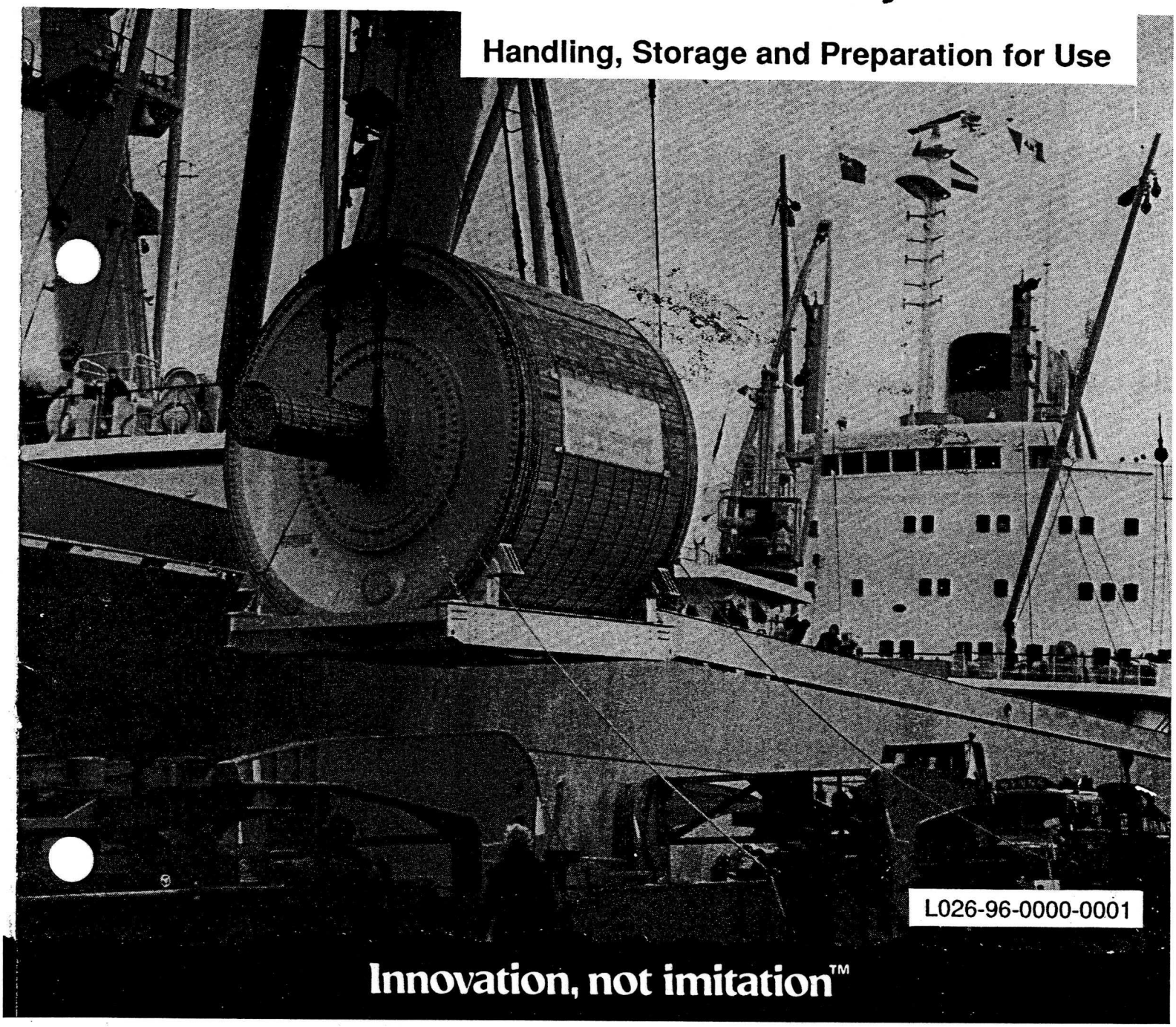
BELOIT CORPORATION

Yankee Dryer

Handling, Storage and Preparation for Use



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Handling, Storage and Preparation for Use

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Table of Contents

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1. INSTRUCTIONS

1. 1. General Information

The surface of the Yankee dryer, supplied by Beloit, is carefully finished before shipment to provide for maximum production when it is installed at the mill. Every precaution should be taken to assure that the high polish is maintained, and that the shell is not damaged or distorted during shipment and storage *(Figure 1)*. Proper care during handling, storage and preparation for use, will reduce the possibility of dryer damage.

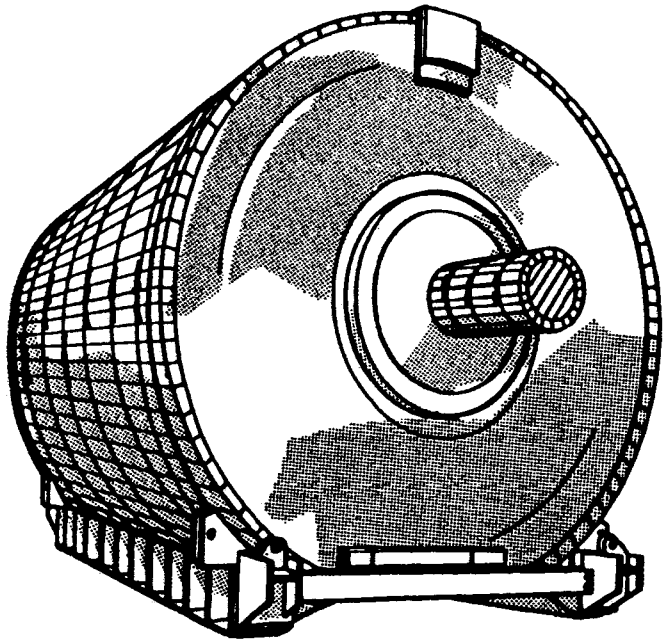

Figure 1. Yankee Dryer Prepared for Shipping

2. SHIPPING, RECEIVING AND INSPECTION

The dryer is protected against damage and corrosion during shipping with paint, wrappings and timber lagging. It is then mounted on a steel shipping skid *(Figure 1)*. Take care during handling, to see that the dryer is not damaged by incorrect lifting, support or jacking.

NOTICE

These instructions are for general use. Specific instructions are provided for customers in data manuals for new Walmsley Yankees.

When the dryer arrives at the mill, inspect it to be sure that the timber lagging is intact and that there is no damage to the dryer from transit. In the event of damage, notify the shippers and Beloit immediately.

3. STORAGE

If the dryer is not installed in the machine soon after it arrives, store it under cover, in a well ventilated, dry area, where it will not be subjected to temperatures below 40°F (4°C).

If storage is for more than one month, it is advised that the dryer be removed from the steel skid and supported in bearings mounted on rigid stands.

To avoid distortion of the shell during storage, it is recommended that the dryer be rotated in its bearings through 90 degrees at one month intervals.

4. REPAIR OF OPEN AREAS IN PROTECTIVE COVERING

If there are any open areas in the protective paint covering on the dryer surface, they must be cleaned and polished before the paint can be reapplied. Clean and polish these areas as follows:

1. Wipe the affected areas with clean rags.
2. Apply "White Spirit" using soft brushes ("White Spirit" is an oliphatic hydrocarbon solvent having a Kauri Butanol value of not less than 35).

⚠CAUTION

Strippers with petroleum or caustic ingredients must be avoided, as these may cause corrosion.

3. Polish areas showing corrosion with a crocus cloth. If this fails, a coarser material such as No. 400 grit emery paper should be used. These areas must then have a final polishing with a crocus cloth.

⚠CAUTION

- Do not use any type of emery cloth to remove corrosion without consulting with Beloit. The cylinder face has a highly polished finish which could be destroyed.
- Polish the corroded area of the cylinder in a circumferential direction only.
- If corrosion has reached the stage where it cannot be removed with a crocus cloth, or No. 400 emery cloth, the cylinder surface may require finishing after installation.

4. If the area is to be held open for inspection for more than a day, cover the uncovered surface with grease.
5. After inspection, remove the grease with "industrial alcohol", dust with French chalk and paint using either two coats of Jetrone K633 Bituminous Black Paint or two thin coats of Dearborn No-Oxid-Id2W.

⚠CAUTION

- A heavy coat of paint will promote what is called "mud-cracking". Allow the first coat of either paint to dry, before applying the second coat.
- To prevent damage to the surface of the dryer, retain the timber lagging around the dryer surface as it is removed from storage, and while it is being installed in the machine.
- To prevent corrosion induced by atmospheric conditions in the mill, keep the protective paint coating on the dryer surface as long as possible.
- To remove the protective paint coating from the dryer face, apply "White Spirit" with a soft bristle broom to soften the coating. Then, remove the soft coating with rubber or plastic blades and wipe with clean soft rags.
- Never scrape the dryer face with metal blades to remove the protective paint coating.

5. TORQUE CHECK REQUIREMENTS FOR M.G. AND TISSUE CREPING DRYER BOLTS AFTER DELIVERY TO SITE

After the dryer is installed in the paper machine, before it is steamed for the first time, all dryer bolts are to be check torqued to the level of torque defined by the dryer manufacturer on the assembly drawing.

Although these bolts have been check torqued by Beloit Walmsley before the dryer is shipped, the torque must be checked for safety reasons and to take care of loss of bolt prestress during transport, before putting the dryer into operation.

After four to six months of operation, check the torque of the dryer bolts again. From then on, check the bolt torque every 12 to 18 months.

6. STEAM PIPING

Clean the pipes before supplying steam through them to the dryer, to remove loose scale, weld berries and other debris.

7. NEW DRYER WARM-UP PROCEDURE

The new dryer must have a sequenced and controlled warm-up procedure to avoid undue thermal stresses in the various dryer components. Dryer failures have occurred during or shortly after an incorrect warm-up.

A responsible person who is familiar with dryer equipment and procedures must be present during warm-up, to monitor and control the initial and subsequent warm-up sequences.

Proceed with the warm-up procedure as follows:

1. Check all pressure gauges and recorders. Be sure that they are fully operative before warm-up.
2. Rotate the dryer during the warm-up sequence at about 100 fpm (30 mpm) to insure even temperature distribution in the shell. Increase speed when the shell temperature has reached 212°F (100°C).
3. Provide warm-up steam from the lowest pressure and temperature source available. Controls should prohibit rapid pressurization of the dryer, and if possible, isolate the warm-up from the operational sequences.
4. Crack open the warm-up valve, using either the manual bypass valve or the warm-up valve from the control panel. The valve opening is correct when there is a low singing note emitted from the passage of steam through the valve. Wait for some time before a temperature increase is noted on the dryer surface. The process should not be rushed. Shortly, it will be possible to feel the heat on the front

journal. Allow time for this heat to spread to the dryer face. It might be about two hours before there is a significant change in the surface temperature of the dryer.

5. Once the temperature has started to increase, take readings on the shell at half hour intervals until the rate of increase has been adjusted by the steam valve to about 50°F (10°C) per hour. Continue to take temperature readings every half hour, until the temperature on the dryer surface has reached about 194°F (90°C). At this point, steam will be blowing off through the bottom of the separator. Close the valve or shut down the equipment to fit the blank-off plate, so that the dryer can be pressurized.
6. The speed of the dryer should now be increased slowly. As the dryer becomes pressurized, adjust the steam valve to give an increase in pressure at a rate of about 7 PSI (0.5 kg/cm^2) every 10 minutes. Open the blow-off valve to the atmosphere to induce a differential for the removal of condensate from within the dryer. The dryer speed should now approximate average operating speed.
7. The recommended warm-up time for a new dryer is 10 to 12 hours from room temperature to 248°F(120°C), plus an additional two hours to reach operating temperature.

⚠CAUTION

Avoid fast dryer warm-ups. The consequences of a fast warm-up can be failure to the pressure containing components due to differential expansion. A fast warm-up can also result in damage to, or failure of, the dryer bearings. The minimum allowable warm-up time for a dryer after shutdown is four to five hours, depending on its size.

8. PREPARING THE DRYER FOR THE SHEET

Before a new dryer is put into operation, it is desirable to prepare the shell face for use by applying oil to it. This will help prevent the rapid wear which occurs when the doctor blades are applied to an untreated surface. It also enables better sheet release and generally protects the dryer surface from damage by the doctor blade, until a ferrous oxide coating is formed by the application of the wet sheet. This oxide coating protects the dryer surface from the action of the doctor blade.

Apply oil to the dryer roll surface as follows:

1. Run fans in the air cap to blow out any dust or grit that would otherwise be transferred to the cylinder surface.
2. Wipe the cylinder surface clean prior to fitting the oil wipe. The oil wipe normally consists of three layers of clean, soft felt laid over the doctor blade holder. These are secured in position with string.

3. Soak the felt in white oil or light machine oil and press it lightly against the cylinder surface by means of the doctor loading equipment.
4. During this application heat the dryer. It will be seen that a coating eventually develops on the dryer surface. In the case of an M.G. cylinder, a bronze doctor blade is usually applied, following the oil wipe for bur-nishing purposes.

9. DRYER COOLDOWN PROCEDURE

To rapidly cool a dryer for maintenance, the following procedure is recommended:

1. Shut off the steam and allow the pressure to drop to zero gauge pressure.
2. Stop the dryer and remove the manhole covers.
3. Withdraw or remove the front steamfit and install a blower to pump cool air into the dryer through the front journal *(Figure 2)*.

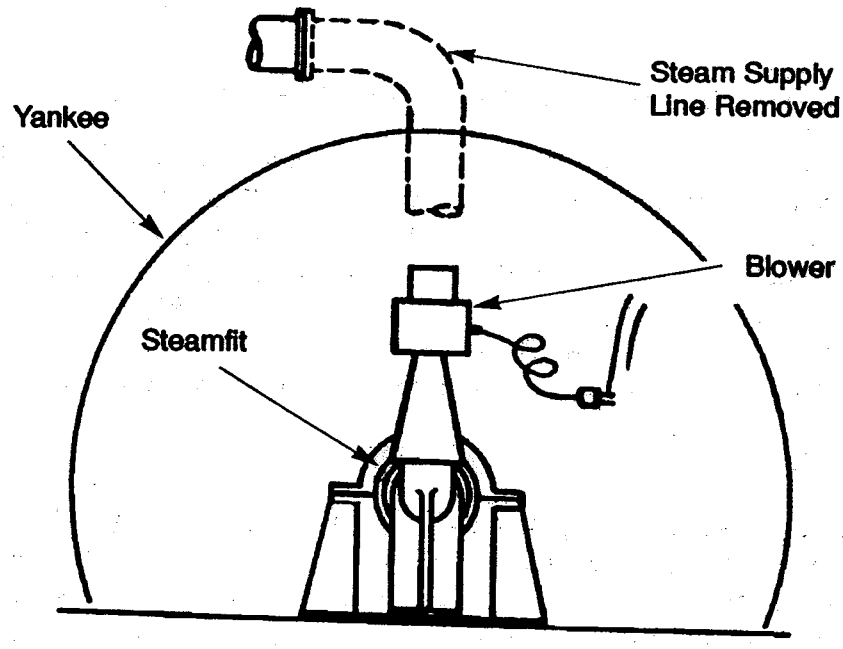

Figure 2. Blower for Cooling Yankee Dryer

4. Rotate the dryer on Sunday drive until the internal dryer temperature is acceptable for entry into the dryer.

⚠CAUTION

- Do not cool dryer by blowing cool air through the air cap fans, while the dryer is running. Ignoring this caution could result in distortion of the dryer shell.

- Do not cool the dryer by running wet felts against its surface. This can result in severe stress conditions and distortion of the shell due to the fact that the outer shell is being cooled much more rapidly than the relatively massive center shaft. The use of a mill water hose on the dryer surface must be avoided for the same reasons.

10. SUNDAY DRIVE

Except when work is being performed inside the dryer, Beloit Corporation recommends that a "Sunday Drive" be used to keep the Yankee dryer rotating and maintain a minimum surface temperature of 100°F (38°C) during down time in order to prevent shell distortion. With "Sunday Drive" the Yankee dryer will require a two hour warm-up period to reach operating pressure and temperature provided the Yankee dryer surface temperature is at least 100°F (38°C) to start. When there is a weekend shutdown, the surface of the Yankee dryer may require an application of rust preventative such as Mobile Kote No. 203 or its equivalent. Mobile Kote No. 203 can be wiped off with industrial alcohol before start up.

11. BEARING MAINTENANCE

Bearing companies have been advocating a maintenance practice of periodically rotating the stationary outer race of anti-friction bearings to distribute wear. The projected gravitational load ordinarily is distributed over 120 degrees of a bearing race. Theoretically then, by occasionally rotating the race 120 degrees, the bearing life should be greatly extended.

Bearings to be rotated should be in good mechanical condition and running well. In particular, there should be no mechanical damage to rotating elements. If the condition of a bearing is questionable, the manufacturer's representative should be contacted.

The following is a recommended procedure for rotating the outer race of Yankee dryer bearings:

1. Remove oil supply lines and bearing caps on both sides of the dryer.
2. Inspect bearings for mechanical condition.
3. Install cribbing under dryer, so that weight is carried to baseplates on both sides.

4. Place a circumferential contoured wood block, about 36 inches long (91 cm) and 6 or 8 inches wide (15 to 20 cm), lined with felt at each end of the dryer shell at the head joint.
5. Use at least two jacks per block for lifting the dryer.
6. It is suggested that both ends of the dryer be raised simultaneously to alleviate the possibility of physical damage to one bearing, while the other one is being rotated.
7. Consideration should be given to the drive chain when lifting the dryer. When the dryer is lifted, the chain may tighten and resist movement. Therefore, the chain may have to be loosened or removed.
8. After the dryer is raised .020 to .025 inch (.5 to .64mm), the outer race can be rotated to the new position. It is suggested that the previously worn area be marked on the visible surface of the race. This will serve as a guide when the bearing is rotated again. Either an electrical etch or a Nissen Metal Marker (John P. Nissen, Jr., Co., Glenside, PA 19038), or other suitable marking device can be used.
9. Lower the dryer and reassemble.
10. After the normal oil flow is started, the Yankee should be run on Sunday drive for at least two hours before speeding it up. Bearings should be closely monitored for at least 24 hours after they are returned to service.

    If bearing maintenance is scheduled at a time when refinishing is also scheduled, we suggest that the bearing maintenance be carried out first.

NOTICE

Follow normal work area cleanliness practices when working on bearings, to prevent bearing contamination.

*Suppliers of rust-inhibiting coating and the coatings supplied:

Supplier	Coating
Ashland Chemical Co., Milwaukee, WI	Tectyl #506 WD
(Daubert Chemical Co.,) Rock Valley Oil & Chemical Co., P.O.Box 293, Rockford, IL	Non-Rust X-110
McGovern Oil Co., 802 Main St., Madison, WI	Petrotect Amber SS

**Supplier of reinforced wrapping and wrapping supplied.

Supplier	Wrapping
Dearborn Chemical Co., Merchandise Mart Plaza, Chicago 54, IL	Dearborn No-Ox-Id #4

12. LUBRICATION RECOMMENDATIONS - DRYER BEARINGS

For proper lubrication recommendations for dryer bearings, see Beloit manual, P10-9600-0010.

13. YANKEE DRYER PLUGGING INSTRUCTIONS

Contact the manufacturer for instructions for the repair of shell surface defects inside the paper web width.

14. DRYER SAFETY

The dryer is a large rotating pressure vessel. It is capable if treated or operated incorrectly of catastrophic failure, resulting in danger to life and nearby equipment. Therefore, it is important that a competent engineer oversee dryer operating procedures.

The engineer will maintain records, including all necessary documentation and certification required to operate the dryer. This ongoing record keeping is essential to avoid loss of important information if there is a change in personnel during the life of the dryer.

In addition to dryer safety, good dryer records are useful for dryer problem solving, ordering dryer replacement parts, dryer maintenance, dryer appraisal by inspection agencies, and dryer resale.

It is recommended that the mill establish ongoing operator training procedures to help assure continuously safe dryer operation.

Minimum dryer training should include:

1. Warm-up procedure.
2. Cool down procedure.
3. Safety valve setting procedure.
4. Record keeping.

5. Dryer entry procedure.
6. Minor repair and maintenance procedures.
7. Leak repair procedures.
8. Refinishing or grinding procedures.
9. Air cap (hood) operation. Dryers operating with high temperature air caps must be protected against exces-sive and non-uniform heating by approved control systems.
10. Control procedures, to protect the dryer against mechanical or thermal loadings produced by pressure rolls or moisture profiling equipment.
11. Conformance with pressure vessel and safety regulations of the country, state or local jurisdiction in which the dryer will operate.
12. Edge cooling showers. Trainees must be taught NOT to use these, as their use could result in the destruction of a dryer by reducing the factor of safety designed into the shell and heads.
13. Steam leak detection. If steam leaks are observed out of dryer bolts or joints, the dryer manufacturer must be contacted for recommendations on how to stop the leaks, while safe guarding the dryer components. Steam leaks should be repaired without delay.