KADANT
BLACK CLAWSON

CHEMI-WASHER® MANUAL
Installation, Operation, Maintenance, Service Parts

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Customer Order Number	4500132671-032-BFLP
KBC Shop Order Number	110114B/111092B
Serial Number	11-CW-0168
Buckeye Equipment Number	FD-2500
KBR Equipment	230-835-220.00
Date	August 10, 2012

Thank you for purchasing a Kadant Black Clawson product.

READ THIS MANUAL carefully to learn how to operate and service your machine correctly; failure to do so could result in personal injury or equipment damage. This manual should be considered a permanent part of the machine and should remain with the machine.

Measurements in this manual are Metric units or their American Engineering equivalents.

This manual has been prepared for general information and guidance only. For specific information concerning parts or items, please refer to the certified prints.

We would appreciate your seeing that operating and maintenance personnel are informed of this manual.

We trust this will be helpful to you in the operation and maintenance of your equipment.

This manual has been specifically prepared to provide the reader with information to install, operate and maintain this equipment.

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Manual Overview

This information is intended to be used as a guide in the care and operation of this machine. Under no circumstances are the contents of this manual to be considered the only way to perform an operation. But, rather, it is to be used as a guide to reach the ultimate goal of safe, trouble-free production. The training and instruction of personnel in the safe method of operation is the employer's responsibility. Qualified instructors along with this manual and experience should be used for the training of the new operators. Periodic refresher sessions should also be held to review the safety procedures and any contemplated operation procedural changes. As personnel become more familiar with the equipment, procedures will be improved and revised to include more efficient and safe operation.

Machine areas that require special procedures are carefully detailed to provide sufficient information to be able to do the job at hand. Safe operation is stressed throughout this manual. Doing an operation with safety in mind pays the greatest dividend, continuation of one's health.

Always follow your Company's lock-out, tag-out and entry procedures.

This manual provides information to install, operate, and maintain
the Kadant Black Clawson Unit.

Kadant Black Clawson has endeavored to supply the equipment according to the negotiated specifications. However, during the life of the equipment, changes and/or modifications may become desired by the user. We do recognize that modifications do take place and are asking your assistance in keeping our records up to date. By doing so, you will insure continued accurate service when ordering parts and/or requesting assistance.

If you contemplate modifications and/or relocation to another plant, please contact us so that we may:

a. Offer assistance through engineering services.
b. Update our records to reflect the latest design.
c. Advise on safety considerations.
d. Review with you possible existing designs that you may want to consider using.

Kadant Black Clawson can offer assistance in installation, start-up, operator training and maintenance programming for your new equipment. Kadant Black Clawson encourages you to discuss your requirements with our Customer Service Department.

The content of this manual does not supersede the job contract and/or engineering drawings supplied. If questions arise as to areas of responsibility for installing and/or supplying, please refer to the job contract, engineering drawings provided or call:

Kadant Black Clawson Company
7312 Central Parke Blvd.
Mason, Ohio 45040
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1.0 Safety

1.1 Safety Introduction

Use this information as a guide in the care and operation of your Kadant Black Clawson equipment. The contents of this manual are not to be considered the only way to perform an operation; it is to be used as a guide for safe and trouble-free production.

The customer is responsible for ensuring that personnel are trained in the safe operation and maintenance of this unit. Refresher sessions covering safety, operation, and maintenance procedures are recommended periodically throughout the life of your Kadant Black Clawson equipment.

Note: Kadant Black Clawson offers qualified field service instructors to help train your operators and maintenance personnel.

RECOGNIZE SAFETY INFORMATION

The triangle to the left with the exclamation mark within it is the international safety alert symbol. When you see this symbol on your equipment or in this manual, be alert to the potential for personal injury. Follow recommended precautions and safe operating practices.

UNDERSTAND SIGNAL WORDS

DANGER

Danger indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. *Danger* is to be limited to the most extreme situations.

WARNING

Warning indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

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

NOTE: Notes place special emphasis on information.

Safety Steps

- Carefully read all safety messages in this manual and on your machine safety signs.
- Do not operate equipment until it has been fully integrated into the system.
- Do not perform service or maintenance work on this equipment until all sources of energy have been locked out and any stored energy has been relieved. (Unit is at Zero Mechanical State.)
- Keep safety signs in good condition.
- Replace missing or damaged safety signs.
- Learn how to operate the machine and how to use controls properly.
- Do not let anyone operate the machine without instruction.
- Keep your machine in proper working condition.
- Do not modify the equipment without authorization from Kadant Black Clawson. Unauthorized modifications may impair the function, shorten the machine life, and/or render built-in safety features useless.
- Inspect unit before starting.
  - All guards and covers are in good condition and fastened in place.
  - No parts are loose, worn, damaged, or missing.
  - All personnel are clear of the equipment.

Safe Maintenance Overview

PRACTICE SAFE MAINTENANCE Keep equipment area clean and dry. Keep all equipment parts in good condition and properly installed. Understand service procedures before you do the work. Replace worn, broken or missing parts. Do not operate damaged equipment - fix damage immediately.	
	**PROTECTIVE CLOTHING** Wear close fitting clothing and safety equipment appropriate to the job.
	Consult applicable Federal, State and Local codes for proper installation and guarding.

1.2 Safety Guidelines

Do not use or service this equipment until you **read and understand** these guidelines and instructions.

If you have any questions, contact your supervisor.

HAZARD AREAS	WHAT COULD HAPPEN		HOW TO PREVENT IT
Stock leaks from pipe connections, blind flanges, body joints, open access doors, etc. Water leaks from shower water, inlet dilution water, or other water sources.		<u>Skin irritation or scalding.</u> Skin contact with stock might result in chemical or thermal skin reaction	**Lockout unit** - follow shut down and start up guidelines. Be sure you have locked out all energy sources. Tighten or replace loose, leaking connections.
Stock leaks from pipe connections, blind flanges, body joints, open access doors, etc. Water leaks from shower water, inlet dilution water, or other water sources.		<u>Skin irritation or scalding.</u> Skin contact with stock might result in chemical or thermal skin reaction	**Lockout unit** - follow shut down and start up guidelines. Be sure you have locked out all energy sources. Tighten or replace loose, leaking connections.

1.3 Safety Practices

Kadant Black Clawson provides a laminated safety sign, pictured below, for this equipment. It is shipped with the unit and should be posted on or near the equipment after installation.

SAFETY INSTRUCTION

STOCK PREPARATION AND PULP MILL EQUIPMENT

Failure to follow these safety instructions may result in serious personal injury or death.

DO NOT PROCEED until you READ and UNDERSTAND these instructions.

1. READ and UNDERSTAND the machine's instruction/operation manual and ALL applicable OSHA regulations (29CFR1010.261).
2. FOLLOW the SHUT DOWN PROCEDURE in the manual.
3. The machine must be brought to a ZERO MECHANICAL STATE and LOCKED OUT with YOUR PADLOCK BEFORE any maintenance, inspection, cleaning, adjusting, or servicing is performed.

a) The MOTOR MAIN POWER DISCONNECT switch must be LOCKED OUT.
b) CHECK DISCONNECT. Try to start motor BEFORE proceeding further.
c) ALL SOURCES OF POWER AND FLOW OF MATERIAL must be SHUT OFF including BLEED OFF of pressure and LOCKING OUT ALL pneumatic, hydraulic, electrical circuits, steam systems, gas systems, and flows of material stock.

NOTE: See the glossary in the equipment manual to obtain the definition of zero mechanical state.

NEVER REMOVE another person's lockout (padlock) or tag.

DO NOT assume the machine is locked out. ALWAYS check yourself.

NOTE: If service are not independent of the main supply, DO NOT PROCEED contact you supervisor.

d) Place or attach a "DANGER - PERSONNEL WORKING" sign near lockout.
e) BLOCK any rotation elements to prevent accidental rotation.

4. DO NOT ENTER vessel or unit unless you have at least ONE OTHER PERSON OUTSIDE the visceral unit at all times. Certain vessels require use or harness, gas masks, and other specialized safety equipment.
5. Upon completion, follow the START UP PROCEDURES in the manual.
6. NEVER START the machine UNLESS

a) All personnel are clear of the machine. b) All doors and hatches are closed.
c) All guards and covers are in place.

If you have any questions, contact you supervisor.

KADANT BLACK CLAWSON

TOLL FREE 24 Emergency Service: 800-448-5422

1510196 R.0

Laminated Safety Sign

The development, implementation and enforcement of safe operating/maintenance procedures have been, and continue to be, the best method of accident prevention. Hazardous procedures should be identified and eliminated through ongoing safety training programs.

Stock preparation equipment requires periodic inspection, maintenance and repairs. Operating areas should be open enough to safely perform such work.

Safety considerations should include:

- Lockouts for zero mechanical state during repairs.
- Stock flow meters to detect plugged stock lines.
- Stock piping systems which permit unit lockout and are equipped with lines for by-pass of stock.
- Adequate lifting devices available to perform maintenance functions.
- Proper guarding and protective clothing in areas of hot stock or steam lines.
- Company procedures for entering confined spaces.
- Use of mechanical assists during internal inspections and maintenance.
- Check for damage and wear each time a unit is opened.
  NOTE: Damage or wear should be corrected immediately to assure safe, reliable, continuous operation.
- Start-up procedures should be followed carefully.

Before servicing any unit, the following procedures are required:

- Shut down stock pumps or divert stock flow.
- Make sure pressure is relieved.
- Activate and post lock out devices.
- De-activate remote control systems.
- Ensure that unit is at Zero Mechanical State.
- Follow company's procedures for entering confined spaces, if applicable.

Kadant Black Clawson accepts no responsibility for use of its products other than the specific application for which it was designed. Any usage other than the product's intended application will render Kadant Black Clawson free and harmless from any safety and/or liability claims that may result from the application or deviation from the product's intended usage.

1.4 Safety During Machine Installation

During the construction and installation phases, the area and nature of the work can lead to hazardous conditions if a constant vigil is not maintained.

Only qualified people, such as millwrights, electricians, etc., should be in the erection area. All others should be kept away.

Proper and safe equipment is required to be on hand to handle the many heavy pieces of machinery. Make sure that all of the safety features are checked and verified before using them.

When erecting columns and structure, make sure the piece is secured, by bracing, bolting, etc. before removing the equipment that was used to set it in place.

Adequate personnel protection such as safety shoes, glasses, hard hats, gloves should be worn at all times. Special personnel protection, as may be required by the job being done, e.g., welders helmets, painters respiratory masks, should be available, in good condition and used by the people doing the job.

Do stay within the load rating of all cranes, hoists, cables, chains, slings, etc.

Do adhere to all codes governing the safe and proper installation of the equipment.

Keep the work areas clean. Do not allow waste materials to accumulate.

Only bring material that is necessary into the erection area. Keep all other neatly stored out of the area.

Do not hurry the job.

Police the area for left behind tools, etc. before starting another section and before any power is connected to the machine.

During the checkout of the machine, always check to be sure personnel and equipment are clear of the area.

Do not try to defeat any safety devices.

Remember, safe work procedures and work areas promote healthy personnel and smooth start-ups.

1.5 Safety Around the Chemi-Washer

Around any operating machinery extra alertness, common sense and judgment must be exercised to ensure a safe operation. When any work is done on the machine, sources of power; electrical, pneumatic, hydraulic or water should be shut down. Guards and shields, as may be installed, are to remain in place during operation.

Open all connections slowly, after blocking or locking movable machine parts, to prevent accidental movement and high velocity discharge of air, oil, water, etc., from the connection.

Take notice of all safety signs mounted on the machine.

Electrical power to be grounded in accordance with NEC requirements.

Guards should be checked every operating shift by the foreman to insure that they are in place and properly secured.

Some Do's and Don'ts for Safety

DO stay outside of the machine frames to avoid moving parts and in-running nips which may result in severe injury or death.

DO check safety features at least twice a month to insure their continued operations.

DO NOT climb on the machine.

DO turn power sources OFF, bring to zero mechanical state and lock out and tag before performing maintenance operations.

DO use CAUTION during maintenance programs when guards may be off.

DO REINSTALL ALL GUARDS at the conclusion of the work before energizing the machine.

DO maintain a clean work area to avoid trip hazards which may result in injury.

DO OPERATE SAFELY.

DO NOT try to stop spinning rolls with hands, feet or any other type of person manipulated device, severe injury may result.

DO BE SURE ALL MACHINE POWER, pneumatic, electrical and hydraulic, is locked OFF and tagged out before entering machine area.

DO observe all warning signs during operation to prevent injury.

DO NOT leave washdown hoses laying around where they may be tripped over.

DO watch footing in wet areas, to avoid slipping and falling.

DO keep loose items away from the machine and OFF the crosswalks.

DO NOT use a portable ladder until after checking to be sure it is secured properly.

DO be sure all safety signs and hand rails are in their proper position.

DO keep away from in-running nips, wire, and roll positioning mechanisms.

DO release pressure from steam, water, and air lines slowly before disconnecting.

DO inspect all lifting equipment before using. DO NOT use slings, cables, or ropes having weak or worn spots.

DO NOT walk underneath machine components while they are suspended from the crane or other lifting devices.

DO NOT enter hood until after it has been fully vented and you have followed your company's confined space entry procedure.

DO lock open the appropriate hood handles to prevent accidental closure once the hood is cleared for entry.

DO lock the appropriate hood handles closed prior to start up to prevent accidental entry.

1.6 Special Safety Devices and Procedures

1. Kadant Black Clawson supplies equipment components which have unique start-up operating and shut-down procedures and safety instructions which will be separately emphasized on schematic and equipment drawings, operating and maintenance sections, and special safety booklets. These special safety procedures should be made part of our Chemi-Washer customer's training and refresher training programs.

2. Kadant Black Clawson endorses the basic safety "lock-out" and "tag out" procedures in current practice at all safety oriented mills. These procedures are designed to preclude accidental operation of electrical motor starters, and other electrical, pneumatic or mechanical devices during maintenance shutdowns. They are the basic responsibility of the mills and therefore Kadant Black Clawson suggests the mill Chemi-Washer training programs include and re-emphasize these important safety practices wherein each person working on equipment utilizes a safety tag, to tag-out "specific devices after critical devices, i.e. motor starters, are "locked out" by supervision.

3. Kadant Black Clawson provides a set of safety signs for installation on the Chemi-Washer. See Section 1.7 on page 18. These are designed to alert all personnel in the Chemi-Washer area to certain hazards and insure safeguards are called to their attention. Kadant Black Clawson recommends that the mill safety committee become familiar with these warnings and institute training and instruction, in compliance with mill safety practices, to observe safe operating and maintenance practices. The mill is responsible for installing and operating the machine according to all applicable safety standards.

4. Kadant Black Clawson specifies the following important safety devices with the Chemi-Washer:

    a) Emergency Stop or "Panic" push-buttons to be located centrally, on the tending and drive sides, for stopping the drive and repulper drive, whenever an "emergency condition" is deemed to exist during operation.

    b) Alarms and warning lights, provided by the customer to conform with mill standards, are called out in the Interlocking Logic diagram. See **Error! Reference source not found.** in Drawing Section **Error! Bookmark not defined.**. These represent Kadant Black Clawson's recommendations for audible and visual alarms to be used in conjunction with specified equipment. We suggest an audible and visual alarm be energized prior to starting the Chemi-Washer. Other recommendations appear in this diagram which should be incorporated in the customer supplied equipment and designed into its installation.

c) Kadant Black Clawson provides, with the Chemi-Washer, limit switches and other similar devices which are designed to provide safe and controlled operation. During installation Kadant Black Clawson field service supervision will set these devices within design limits. These devices must be maintained operational and within prescribed limits by the customer. In addition certain interlock and safety devices are also provided to safeguard personnel performing both operating adjustments and shut-down maintenance. The customer must maintain these devices operational.

5. Chemi-Washer Area Personnel Access and Passage

The Chemi-Washer has been designed as a machine which may be remotely operated, requiring only periodic "roving" operating surveillance and shut-down maintenance. This places additional customer awareness and training requirements in the control of personnel in the Chemi-Washer area. The following safety recommendations are offered to assist our customers in integrating mill safety rules and practices to the Chemi-Washer installation:

a) The operating floor, on the tending side, should be painted with a bold, wide safety stripe, to warn passing personnel of the presence of the moving wire and supporting rolls. Similar floor markings at the drive side, are also suggested, but structural barriers may offer the opportunity to limit these markings to the access areas. The tending side floor markings should also define the safe traffic way, and if to be walked upon be of non-skid painted surface.

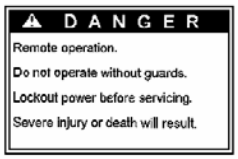
b) Careful attention and study of the assembly drawings located in Drawing Section 17 for wire change and Drawing Section 18 for roll change sequence should be made so that the customer may supplement Kadant Black Clawson's field service training with the necessary safety awareness for their personnel to be assigned these responsibilities. Again, mill safety practices may require special training or additional cautionary warning signs by our customer, to conform (other than provided by Kadant Black Clawson) to ongoing programs.

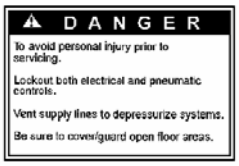
1.7 Safety Signs

Kadant Black Clawson furnishes safety signs with each piece of equipment. These signs are factory installed and should remain on the unit for the life of the machine.

Do not remove the signs unless replacement signs are in hand and installed immediately after old signs are removed. Replacement part numbers for each sign are supplied below.

The following safety signs are attached to the unit





2.0 Equipment Identification

2.1 Nameplate

Product identification numbers include the serial number, job or shop order number, and model number. They are provided to help identify this unit if it needs service.

Kadant Black Clawson needs these numbers when you order parts.

3.0 General Information

3.1 Equipment Detail

The Chemi-Washer is a belt type horizontal washer, washing counter-currently in six (6) stages.

The Chemi-Washer uses a pin seamed plastic wire, for quick wire changes.

The required vacuum for the Chemi-Washer is kept to a minimum ensuring a minimum drag and low wire wear and power consumption, while maintaining maximum washing efficiency.

The Chemi-Washer design allows the intermediate filtrate tanks to be eliminated because of the feature of large surface areas within the suction box zones is utilized for breaking foam. Furthermore, the gases, separated into the zones and exhausted by the blower, are recycled back into the hood.

The recirculation of the gases into the hood very quickly establishes an atmosphere which has a high relative humidity. Since it is the air and not the water vapor which generates foam, very little is present. The internal configuration of the machine is such as to break this small quantity of foam before it is able to cause any problems.

The principle of separating the gas from the liquor and recycling it to the hood has enabled the machine to be commercially successful in kraft, sulfite, and semi-chemical pulp washing.

Today's wires have excellent chemical and temperature resistance, support the high traction, wear very little and provide ample passage for the separated liquors. Kadant Black Clawson's experience with the latest design of wires shows a minimum wire life of six (6) months under normal operating conditions.

The Chemi-Washer is designed for continuous 24 hours per day operation and once started up, does not require constant supervision. Each of the various components making up the Chemi-Washer is described in the following sections of this manual.

3.2 Specifications

Specification of Machine Operating Conditions

The pulp to be washed is defined as follows:

Raw Material	Southern Pine
Process	Bleached Kraft
Headbox Consistency	3.0%
Inlet Pulp Temperature	195^{o}F

The Chemi-Washer will operate under the following conditions:

Design Tonnage	Per Drainage Test (170 ADMT/D)
Suction Area	30m^2
Suction Width.	3m
Suction Length	10m
Wire Width	3200mm
Basis Weight	Per Drainage Test (1,300 g/m^2)
Speed	100 fpm
Speed Range	50 – 200 fpm
Wash Liquor Temperature	165°F Minimum
Dilution Factor	1
Wash Stages	7
Vacuum	0 – 42” H_2O
Hand of Machine	Right*

***NOTE: When standing in the Tending Side aisle, facing the machine, the stock travels from left to right.**

UTILITIES AND AUXILIARIES

The following utilities and auxiliaries are to be provided by Customer:

UTILITIES

Electric

Controls	120 volts, 1 phase, 60 hertz

Air Supply

Mill Air	300 cfm @ 50 psi clean and dry
Instrument	50 psi clean and dry

NOTE: Motors - All motors which are a part of this contract will be supplied less starting equipment. All motors not specified in this contract will be furnished by customer.

The above list is for the guidance of the Buyer and shall not be deemed as being a definite list of items to be supplied by the Buyer. Nothing contained herein shall obligate Kadant Black Clawson to supply any equipment not included in the contract specifications.

4.0 Shipment Check

4.1 Preparation for Shipping

The equipment that you are receiving has been pre-assembled where necessary. For shipping purposes, some machine sections must be disassembled.

Prior to disassembly, matching tags are affixed and match marked at the adjoining points of disassembly. Piping that has been installed for air, hydraulic and/or water and must be broken for shipment is also tagged for ease of reassembly. Plugs or tape is used to seal all piping which is disassembled for shipment. Electrical wiring, when required, is disconnected from the terminal points and has corresponding labels installed.

The disassembled machine sections are containerized, boxed, crated, or bundled, shipped loose or mounted on skids for shipment.

As much as possible, a component machine section will be packaged together even though it has been broken down for shipping.

Loose items, such as columns, crossties and similar non-machined pieces are generally non-packaged items.

4.2 Protection of Machine Surfaces

Some exposed, unpainted, machined surfaces are coated with "Nox Rust 369" to protect against rust during shipment and storage. This is very thick petroleum derivative which is not affected by sunlight or low temperatures and forms a hard surface that does not chafe easily. Assuming that adequate handling and storage precautions are taken to prevent chafing, this protection is generally good for at least two years of outside storage. The coating should be checked periodically, however, and additional coating applied to any chafed areas, where needed.

The coating of Nox Rust is quite difficult to remove but will come off using a petroleum solvent. It is advisable to remove this coating before installation, giving proper attention to any surface showing signs of rust. After erection you may apply a low viscosity protective film designed for easy removal.

All other machined surfaces are coated with a rust inhibitor that is easily removed at installation with most any solvent that is approved for use by the installation site supervisory personnel.

4.3 Preparation for Shipping

Packing List/Manifest
The shipping bill-of-lading documents are your key to the contents of a particular shipment. It specifies the container number, type of container, and a list of items in the container. Please check the bill-of-materials list on each Sub-Assembly Drawing.

Receiving
The method of receiving and storing equipment from arrival to installation can expedite or retard the orderly progression of installation. Kadant Black Clawson highly recommends that all equipment received be placed in a protected and controlled area that can be secured to prevent access by unauthorized people.

As each shipment arrives, carefully inspect it for damage that may have occurred during transit. Of particular importance for inspection are instrument panels and consoles. Internal inspection of these cabinets is required. Dismantling of the shipping container is necessary to accomplish this, but it is imperative that protection of the cabinets be provided immediately after the conclusion of the inspection. If damage has occurred, report it immediately to the carrier and advise Kadant Black Clawson. Please refer to the information on the manifest when reporting missing or damaged equipment.

After checking the shipment against the manifest, move the equipment to the storage area or installation location. We suggest that the storage area be sectioned off and a record made where each piece of equipment is placed. This will provide efficient retrieval of desired parts.

The containers are carefully made to facilitate moving by crane and/or fork lift.

All calls to Kadant Black Clawson concerning shipments received should be directed to the Customer Service Department, or Kadant Black Clawson site supervisor.

5.0 Storage

5.1 Unit Storage

The following procedure is suggested for preparing and maintaining the Chemi-Washer during a shutdown of extended duration. These instructions are intended to be a guide for this operation and Kadant Black Clawson is not liable for damage to a machine resulting from a prolonged shutdown when this procedure is followed. The products suggested here are typical and do not exclude comparable products available.

1. Machine must be thoroughly cleaned and old machines should be in as near "new" condition as possible.

2. All greased bearings should be inspected and cleaned. A hot dip-coating of "NO-OX-IDE #580" is recommended by bearing manufacturers for protecting anti-friction bearings. This is a product of the Sanchem Chemical Company and is compatible with most bearing lubricants. Kadant Black Clawson Lube No. 262 can also be used if the following precautions are taken.
   a) Apply to clean bearings through pressure fittings in housings.
   b) Rotate bearing slowly while applying grease.
   c) Re-grease every 30 days, rotating bearing during greasing operation.
   d) Clean bearing and re-grease prior to start-up.

3. Lubricant circulating systems should be drained and flushed. Use light flushing oil and follow the procedure given in the circulating system manual. Use Mobilarma 523 (or equivalent) circulating through entire system for four hours at 130° F (54° C). Use only enough flushing oil in storage tank to prevent cavitation of pumps. Leave oil in tank. Every two weeks circulate through system two hours. To start up, drain system and fill with regular lubricant. No flushing is required.

4. Machined surfaces (open gears, screws, ways and slides, roll faces, etc.) should be covered with Mobilarma 355, (Or equal). This can be applied by brush or heated to 125° F (52° C) and sprayed. This material can be removed by a light washing with solvent. All unpainted metal may be protected against rust in this manner. This compound however, is not recommended for extended outside or yard storage.

5. Pneumatic equipment should be operated every 2 or 3 months with Mobilarma 523 (or equivalent) in air line lubricators.

5.2 Roll Handling and Storage

Store rolls in a cool, dark, damp room. Keep away from sunlight or sudden temperature change.

"Cold" rolls which have been stored should be allowed to reach ambient temperatures before use.

(Ideal storage temperature: about 60° F [16° C].)

Rolls should be stored in shipping cases, if possible. Otherwise, they should be protected with strong wrapping paper, covered with old felts, burlap, or pulp laps.

Always support the roll on its journals, giving it a quarter turn every three (3) months. Don't allow it to rest on the rubber cover, even for a short time.

If possible, handle rolls with a crane which has two hoists, and a separate chain and sling for each journal. (If the crane has only one lift, use a yoke or the spreader bar provided with adjustable slings at each end.)

You can use a wide, flat belt as a sling. Be sure there's nothing on its surface to scratch the cover - and, for safety, provide padding.

If rolls must be transported on small factory trucks, provide padding to eliminate any contact with wood or metal.

Store rolls away from traffic lanes to avoid damage by passing equipment. And make sure no grease or oil come in contact with the rubber cover.

6.0 Installation

6.1 General Installation

The following pages contain specific installation tips.

The previously supplied assembly drawings will be extensively used during the installation.

The placement of anchor bolts are found on the foundation drawings. See Drawing Section 2 for recommended anchor bolt installation. The location of the bolts should be field verified prior to setting the equipment.

Placement of machines is shown on the General Assembly or Machine Elevation drawings. This drawing also directs you to the individual assembly drawings for greater detail of assembling and mounting dimensions.

Refer to Section 6: Chemi-Washer Equipment for specific vendor brochures for greater installation information.

Beginning with Section 8.3 on page 39: Maintenance for information on machine lubrication

Drawings of particular interest during assembly:

Description	Drawing Section
General Assembly – Elevation	1
General Assembly - Plan View	1
General Assembly - Cross Section	1
Foundation Plan	2
Stretcher Assembly	10
Headbox Assembly	13

Initial Preparation
All equipment must be cleaned and inspected before installation. Machined surfaces coated with a rust preventative must be washed with a high flash mineral solvent or kerosene. All threads showing sign of damage should have a cleaning pass with the proper tap or die. Nicks or scratches on machined surfaces should be dressed smooth with a file.

Bolting
All bolt threads are to be painted with a lubricant, rust preventative mixture, such as never-seize, prior to installation.

6.2 Tolerance Guides

Policy
The tolerances suggested in this guide are for the establishment of general guidelines for those involved in scheduling and executing the installation of the machine. The actual tolerances maintained during the erection of this machine is the responsibility of the customer's erecting force.

All grout design and placement of grout is provided as part of the installation. Deviations from standard grouting practice, such as hollows, could result in structural failure.

Any changes to the machine that are necessary during installation must be signed off and approved by a KBC representative. This specifically applies to backcharge and warranty issues.

Chemi-Washer Beams
All beams should be within 0.15” (4mm) design height. The side beams should be located so that the distance between rail center lines is within 0.15” (4mm) of specified width.

Leveling and Squaring Rolls
The rolls should be at the specified elevation. The couch and breast rolls should check parallel to the square lines within 0.003”/100” (.08mm/2540mm) width. Kadant Black Clawson recommends measuring wire path length (around all rolls) on both tending and drive sides after roll installation. Tending and drive side measurements should be equal. A preliminary optical alignment after rolls are installed, and a final optical alignment after complete assembly of the Chemi-Washer is also recommended.

Foundations
Foundation tops shall be cleaned of all loose concrete chips or dust. Anchor bolt pockets should be cleaned and free of particles and dust.

7.0 Operation

7.1 Start-up & Shutdown Procedures

Review "Special Safety Devices" and their intended use, as described in Section 1.6 on page 16 and detailed in drawings; and particularly "Emergency Stop" push button locations, as installed, with all operating personnel. Safety instructions based on these recommendations and mill practices should be reviewed prior to start-up.

Start-up (Normal)

1. Check Machine Area--Wire, Hood, Etc.
2. Bring wire speed up to 15 feet per minute.
3. Start-up the High Pressure Wire Cleaning Shower Supply Pump. Make sure the flow is at 23 GPM.
4. Start-up knock off shower supply pump and set flow to a minimum of 140 GPM.
5. Set make up water flow to the Seventh (7th) Stage Wash Shower at 230 GPM.
6. Open up the nip flooding shower valve and make sure the flow is at least 100 GPM.
7. Start-up Inter Stage Pumps and Formation Zone pump. Put level control on automatic at the set point.
8. Open Formation Zone Vacuum Control valve to 10% open, and open each wash zone Vacuum Control Valve to 20% open.
9. Start-up Fans.
10. Open the Fan Inlet Valves to 20% open.
11. When all controls are in the desired range continue with the following steps:
12. Open the Chemi-Washer Feed Valve to Desired Flow.
13. Open the Fan Inlet Valves to 100% open and adjust the zone vacuum control valves to get the desired vacuum.

Shutdown (Normal)

1. Close the Chemi-Washer Pulp Feed Valve

2. Shutdown Vacuum Fans after pulp clears the washer, unless needed for venting the hood.

3. Flush Headbox and Chemi-Washer feed piping with liquor or water for one minute or until flow is free of pulp to prevent plugging.

4. Shutdown the nip flood shower pump, the knock-off shower pump, and the high pressure wire cleaning shower pump.

5. Close the seventh stage shower make-up water valve.

6. Shutdown the Save-all pump.

7. Shutdown the interstage and formation zone filtrate pumps.

8. Bring the wire speed to zero feet per minute.

9. Shutdown fan after venting is completed (hood access only).

10. For extended shutdowns, release wire tension.

8.0 Maintenance

8.1 Routine Maintenance

A good maintenance program for any machine pays for itself by decreasing the downtime and expensive replacement of items that go beyond repair. The following chart highlights the areas that should be checked periodically for wear, looseness or other abnormal signs that will require attention. The frequency of check is suggested only and experience may dictate some tempering. The suggested time is based on 24 hours per day, 7 days a week operation. For other operating schedules, convert these times to days and weeks.

General Maintenance

ITEMS TO BE CHECKED	CHECK FOR	FREQUENCY
Bolts on moving mechanisms that have a high cycling rate	Tightness	After 1st 50 hours, thereafter, every 160 hours.
Shaft collars on bearings sprockets and pulleys	Position and tightness on shaft	Every 320 hours.
Shaft couplings	Position and tightness on shaft	Every 320 hours.
Safety Guards	Properly installed	Every shift.
Safety devices (trip cord switch latches & alarms)	Operation	Every 160 hours.
Adjustable linkage arms	Position & Operation	Every 160 hours.

THE ITEMS LISTED ABOVE EXCEPT FOR THE SAFETY GUARDS ARE TO BE CHECKED WHEN THE MACHINE IS SHUT DOWN, NOT WHILE RUNNING.

All Sections
Air line filters that have been supplied and mounted on the equipment need to be checked weekly to see that they are dumping the foreign matter that will accumulate in the bowl.

The air line lubricators must also be checked weekly at first to be sure that they are filled. The time between refills can be established from the usage rate as observed during the initial checking.

8.2 Care and Maintenance of Rolls

The importance of proper roll maintenance cannot be over-stressed. In terms of increased efficiency, lower operating costs and improved product, the dividends it pays are virtually incalculable.

This section deals in detail with proper maintenance procedure for the major type of rolls supplied to the industry.

It also covers basic maintenance procedures which apply equally to all rolls.

These procedures constitute the ideal maintenance program. While we realize that operating requirements will make it impossible for you to follow every recommendation to the letter, for best results every effort should be made to comply as nearly as possible.

And while every effort has been made to provide sufficient details for maximum usefulness, it is important to remember that no maintenance manual intended for general use can possibly answer all your questions. The infinite variables involved in any specific operating problem obviously preclude such a possibility.

That's where the Manufacturer's engineer can be of help. Whenever you have a specific maintenance problem beyond the scope of this manual, or any roll problem at all, in fact, keep him in mind.

Through your local representative, he can focus on your problems a combination of technological resources, facilities, and experience unparalleled in the industry.

The more you know about rubber - and how it behaves - the more time and money you can save through an intelligently planned program of roll maintenance.

Rubber is a unique engineering material. Under stress, it behaves in it's own characteristic way - a way totally unlike steel, or wood, or iron, or any other engineering materials.

It is this unique behavior that gives rubber its special value as a roll covering.

Consequently, any discussion of maintenance basics must begin with a close look at rubber itself - for a better knowledge of its characteristics provides an indispensable key to reduced costs and improved performance from your rolls.

Basic Properties
First, what kind of rubber is used in roll coverings? All kinds. Not only natural rubber from the tree, but neoprene, nitrile, SBR, Polyurethane, and other synthetics. Kadant Black Clawson's Chemi-Washer rolls are normally a nitrite compound unless very special applications arise. For the sake of convenience, the term "rubber" will be used here to encompass them all.

But what are some of these basic properties? And how do they affect rubber roll performance?

Displaceability
Rubber is displaceable. It is not compressible. This is important to remember with rubber covered rolls. As the rubber goes through the nip, it is not compressed - it is forced to assume a different shape as it moves away from the load. When the load exceeds the rubber's capacity to adjust, failure within the rubber may occur. Such failure can result in corrugations, cracks, grooves, or other abnormal wear patterns.

Resilience
Resilience is the property of rubber which causes it to return to its original form after being displaced. It is this capacity to recover quickly from distortion after its passage through the nip that makes rubber uniquely valuable as a roll cover.

Creep
Under a continued load, rubber continues to "creep" or flow. If a rubber covered roll is left in a loaded position during shutdown, the rubber will gradually flow away from the load, causing the roll to "Flat Spot".

Creep or flow occurs when a roll is kept in storage without turning.

That's why releasing nip loads during shutdowns and turning rolls in storage is so important. Creep tendencies are greatest in the case of thick, soft covers.

The degree of creep under a continued static load or excessive impact or displacement is sometimes incorrectly termed "compression set". For example, a roll allowed to remain on the floor will "flat spot" - the rubber creeps away from the area of greatest load and does not completely return to its original shape on removal of load. Since the rubber has assumed a new shape, only grinding well below the affected area will correct the condition - all the rubber subjected to such a stress must be removed.

Thermal Expansion
Rubber has a high coefficient of expansion under heat - nearly ten times that of most metals. That means that as a rubber covered roll becomes warm, the cover expands in volume approximately 10 times faster than the metal to which it is bonded. In operation, localized heat can change the contours of a roll, and sudden, severe changes in temperature create the possibility of damage from thermal shock.

NOTE: *All Chemi-Washer rolls are rubber covered and are not crowned.*

Flex Cracking
End cracking, and (sometimes) cracks in the surface are the result of continual bending or displacement which exceeds the limits of the rubber. Flex cracks usually form in an axial pattern, indicating that the flex fatigue point of the rubber has been exceeded.

High ends, improper crown, unequal distribution of pressure across a roll face, and misalignment are common causes of flex cracking.

Hardness
Not to be confused with "density", which means weight per unit volume. Hardness means solely the resistance of rubber to indentation. It can be measured by the P & J Plastometer which measures the penetration of 3 mm (1/8") diameter ball into the rubber in terms of hundreds of millimeters under a 1 kilogram load: or by the Short A Durometer, which uses a blunt point to measure hardness on a scale reading 0 to 100, soft to hard. Normal P & J reading is 20 +/- 3.

Heat Resistance
Heat accelerates oxidation, which causes deterioration in the form of heat checks, cracks, softening, or hardening. The ability to withstand high temperatures is a specific property of each different rubber compound.

Abrasion Resistance
The ability of rubber to withstand wear can be modified by compounding and polymer selection - at times at the expense of heat buildup or cracking resistance.

Oil Resistance
All rubber compounds or synthetics are affected by oil attack; they vary only in degree of resistance. Oil dropped on a roll will cause a high soft spot to form in the affected area. Covers may be made additionally oil resistant, but they are never totally impervious to oil attack

Elongation
One of the rubber's fundamental properties, its capacity to stretch and return to approximately its original size and shape is measured as a percentage of its original length.

Tensile Strength
The force required to cause rubber to stretch and ultimately break. (Expressed in pounds per square inch required to cause rupture.)

Chemical Resistance
Each type of rubber compound has its own specific resistance to attack by chemicals. Thus selection of a compound for a specific application must be based on knowledge of the chemicals with which the rubber will come in contact.

Oxidation
A deterioration of the surface from prolonged exposure to the atmosphere. It usually appears as a hard, brittle crust which can readily be removed by grinding.

Ozone Attack
Rubber compounds are rapidly attacked by exposure to ozone, which causes small surface cracks. Ozone is present in large concentrations near electrical installation such as motors, switches and circuit breakers. Be careful not to store rolls near such units.

Sunlight Aging
Ultra violet degradation is similar to ozone aging in effect. Rolls should never be stored uncovered in direct sunlight.

General Maintenance Procedures for Rolls
Bearing in mind the basic properties of rubber, and the need to increase our understanding of them, let's take a closer look at the Chemi-Washer™ rolls.

What exactly happens in the endlessly complex sandwich known as the nip? Here the wire and the roll usually of different materials of diverse physical and chemical properties - a mat of pulp varying in moisture and physical strength, and incorporating an endless variety of constantly changing conditions. This is so complicated, in fact, that is bewildering variables under dynamic conditions, can be measured only with very elaborate instrumentation. But that doesn't mean that you can't improve your maintenance methods - dramatically. What it does mean is that no pulp mill can continue to rely on old-fashioned methods of observation (often limited largely to visual inspection of the wire, and roll) in order to determine when and if a roll needs regrinding.

What it does mean is taking advantage of the latest techniques of measuring and recording in order to achieve the maximum possible savings in a specific instance.

It is extremely important to maintain complete performance records. Only in this way can the rubber technologist be of assistance in solving your problems, anticipating new requirements because of your changing conditions and in developing new rubber covers to meet these new conditions. For example:

Visual Inspection
Visual inspection of rubber rolls whenever the machine is down is vital to any maintenance program. The appearance of slight cracks, checking, scuffing, corrugating are all signs of trouble.

It is important to spot them early, so that loading adjustment can be made and roll reground.

Here (as in every other stage of a planned maintenance program) accurate record keeping as to the nature of the roll surface and other pertinent data, is vital.

And here again, your representative can be of service by providing the record keeping forms best suited to your needs and operations.

Roll Support Bearings
Spherical Roller Bearings with tapered bores are used for heavy loads, consequently they have relatively tight interference fits between the inner ring of the bearing and the shaft to which they are mounted.

This interference fit expands the inner ring of the bearing which in turn reduces the radial clearance between the inner ring and the bearings, and between the bearings and the outer ring. This reduction of clearance which results from the expansion of the inner ring of the bearing by forcing the bearings onto the tapered shaft is called "The Reduction of Diametrical Clearance". It is the amount of this reduction of clearance which determines the proper fit of the bearings on its shaft. To determine the reduction of diametrical clearance, it is necessary to measure the clearance before and during the drive up of the bearing on the shaft.

Measuring the Diametrical Clearance
With the bearing un-mounted, rotate the inner ring and the roller set to seat the rollers in the outer ring. Using a feeler gauge, .0018"(0.045mm) to .00240" (.06mm) thick, of a width which is less than the width of the bearing, insert the feeler blade between two rollers located at the top of the bearing.

(NOTE: The diametrical clearance is always measured on the loose side of the bearing. Measuring the clearance on top as stated above assumes that the bottom of the bearing is supported on the floor or a table. With the bearing supported on the roll journal, the clearance would be measured on the bottom as shown on the next page.)

Slide the blade circumferentially toward the roller nearest to the top of the bearing. The blade should pass between the uppermost roller and the inside surface of the outer ring. Do this with successively larger feeler blades until a blade will not pass. Using the blade which will not slide between the roller and outer ring, position the blade so that it approaches the bite between the uppermost roller and the outer ring. Rotate the inner ring so that the roller rolls under the feeler blade. With the blade between the roller and the inside surface of the outer ring, attempt to

swivel the blade while withdrawing it axially. The swiveling action will seat the roller to provide a more accurate measurement of the internal clearance.

Repeat this procedure using .001" (0.0254mm) thicker feeler gauge blades until a blade cannot be swiveled and withdrawn after which the next thicker blade has jammed.

Repeat this procedure in two or three other locations, but always making sure that the roller being measured is on top. (i.e., on the loose side)

Either repeat the above procedure for the other set of rollers or measure each row alternately.

Be sure to make a note of the un-mounted internal clearance as the difference between the un-mounted clearance and the clearance after drive up will determine the "Reduction of Diametrical Clearance".

8.3 General Lubrication

--- DON'T WAIT TO LUBRICATE ---

This manual is devoted exclusively to the cause of aiding and promoting the proper lubrication of the equipment which we supply.

The information contained within, has been compiled from a wide variety of sources and has been organized and cross referenced to yield a convenient data source.

It is hoped that through careful use of this document and a scheduled lubrication program, you will obtain the optimum number of productive years from your equipment.

-- Remember, lubrication is a preventative medicine. --

General Information
Proper lubrication, along with a good maintenance schedule, is probably the biggest factor in deterring breakdowns of the equipment. Lubrication, as important as it is, is often times left to a hit and miss program. Of course, these types of programs do not pay. Kadant Black Clawson has endeavored to make lubricating points accessible and expects that lubrication will take place on a timely basis.

Generally, anything that moves is going to require lubrication in one form or another. There are many factors that determine the type of lubricant to be used, such as temperature, location, indoors, outdoors, whether it's a wet or dry area and the type of friction that is being reduced--sliding or rolling. It is impossible, therefore to recommend a single lubricant to cover all applications. The following pages list general types of friction points and a typical recommended lubricant classification. Following that is an oil company product cross reference chart that correlates with the Kadant Black Clawson lube number reference.

Kadant Black Clawson does not test or approve specific lubricants. Lubricant recommendations sheets have been prepared by several leading oil companies, and those lubricants recommended represent the best offered by the individual companies on the basis of analysis and actual use on Chemi-Washers, paper and plastics machinery. If your supplier is not included, Kadant Black Clawson will cooperate with any reputable manufacturer regarding the use of their products.

Major modifications or recommendations should be made only with the advice of a competent Lubrication Engineer.

Setting Up a Lubrication Program
The necessity for having a routine lubrication schedule has been proved through the years to be one of the single most important factors in maintaining reliable productivity of machines. The following is for supplementing established maintenance schedules, where they exist, and/or for organizing new schedules.

Initial
During the installation of the equipment, the people responsible for lubrication should tour and review all points requiring lubrication. Specific points of lubrication are noted on the Lubrication Service Instruction sheets which are an attachment to this manual.

Review all the requirements with your Lubrication Engineer and lubricant supplier.

Before the initial start-up, perform all lubrication as required.

Long Term
A check sheet or log is an invaluable tool in keeping track of the required lubrication. Data, such as suggested frequency and lubrication type can be found on the Lubrication Service Instruction sheets supplied with this manual for your particular machine.

Points to Remember

Bearings: Caution must be used when lubricating a bearing so as not to overfill it. Too much lubricant is as detrimental to a bearing as running it without any lubrication.

Oil lubricated bearings only require enough oil so that a film can form on the working surfaces. More oil will only increase the friction torque of the bearing as it tries to displace and shear the excessive quantity of oil.

Grease lubricated bearings fall into this same type of problem area when overfilled. Generally, bearings are only about one-third full so that the extra room will accept the normal expansion of the grease, rather than forcing it out through the seals. This also minimizes friction torque from shearing excessive grease.

Bearings should be rotated while re-lubricating to insure the distribution of the lubricant into the bearing proper.

On grease lubricated bearings with visible seals, only apply grease until a slight bead forms around the seals.

DO NOT OVERGREASE.

Gear Boxes - Always follow the manufacturer's recommendations, which usually appear on the gearbox itself, or in the vendor supplied literature included in the respective section of this manual.

Most gear boxes are shipped less oil and must be filled prior to starting.

Typical Lubrication Intervals Friction Point	Maximum Operating Interval
Pivots and Bushings	30 days
Ways and Lead Screws	30 days or as required

Anti-Friction Bearings*

A. 1500 RPM max & 50° F (10° C) to 125° F (51°C)

operating temperature.

To 1.5" (3.81cm) size	160 hours
1.5" (3.81cm) to 4" (10.16cm) size	80 hours
Over 4" (10.16cm)	40 hours

B. 1500 to 3000 RPM, 125° F (51° C) to 300° F (149° C) operating temperature.

Up to 3" (7.62cm) size	80 hours
Over 3" (7.62cm)	40 hours

C. 1500 RPM MAX. 400° F (204° C) to 300° F (149° C) operating temperature

All sizes	24 hours

*Operating temperature is actual bearing temperature not just the prevailing ambient.

DO LUBRICATION SAFELY **DO NOT OVER LUBRICATE**

8.4 Chemi-Washer Lubrication

LUBE POINT	METHOD	B.C. LUBE NO.	FREQUENCY
Anti-Friction bearings (All Chemi-Washer rolls)	Pressure fittings	262	160 hours
Seal Doctor Pivot Bearings	Pressure fittings	262	210 hours
Cross Shaft Bearings on Wire Tension Mechanism	Pressure fittings	262	320 hours
Stretcher Roll Positioning. See instructions on following page or Duff-Norton Maintenance Manual.			
Wire Guide Pivot	Pressure fittings	262	160 hours
Misc. Oiling	Oil can, wipe	211	As required
Misc. Greasing (Linkage pins and required bushings, labyrinth brush seals.)	Fittings hand packed, brush	262	As required
Drives	Follow manufacturer's recommendations.		

Joyce/Dayton Worm Gear Jacks

1. The jacks are shipped with grease which should be sufficient for one month of normal operation.

2. The products listed below are recommended by the lubricant manufacturers to meet the requirements for normal operation. The listing of brand names is solely for the convenience of users of Joyce equipment and their lubricant suppliers; it does not constitute any endorsement. Joyce/Dayton assumes no responsibilities for the quality, performance or availability of any listed products.

COMPANY	BRAND NAME
Mobilgrease	XHP 461
Shell Oil Company	Retinax HD NLGI 1
Shell Oil Company	Albina SLC 460
Mobil Oil	Mobilith SHC PM 460

8.5 AC Motor Lubrication

With Grease Fittings
Under normal operating conditions, it is only necessary to re-grease a ball bearing motor every two to six years, depending upon the motor speed and operating conditions. A sound greasing procedure should be followed when re-greasing a motor for it has been determined that **THE GREATEST CAUSE OF BEARING FAILURE IS OVER GREASING RATHER THAN UNDER GREASING**.

When re-greasing, the following steps should be followed:

1. Clean the exterior of the motor.

2. Remove both the grease plug and relief plug (if supplied).

3. If grease has hardened, run a rod or wire a short distance into chamber to break grease. In severe conditions, run motor until bearing chamber becomes heated.

4. Re-grease motor with low pressure grease gun.

5. For optimum operation, the bearing chamber should be three quarters full of grease.

6. Operate motor for minimum of one hour.

7. Replace grease plugs.

NOTE: If the bearings are rough, the motor should be disassembled and the bearings replaced. Re-pack the bearings and bearing chamber with enough grease so that the bearing chamber of the assembled motor will be approximately three quarters full.

Without Grease Fittings
Bearings are factory lubricated for normal life.

When re-greasing, refer to motor vendor data.

8.6 Lubrication Schedule for Ball Bearings**

APPROXIMATE HOURS OF OPERATION

Motor Speed	Normal Conditions*	Severe Conditions
1200 & below	6000 - 8000	3000 - 4000
1800	3000 - 4000	1400 - 2000
3600	1500 - 2000	750 - 1000

*NORMAL conditions are considered to include most ambient atmospheres and operation requirements.

SEVERE conditions include the following:

1. Extreme dust, dirt or other atmospheric contaminants.

2. Direct exposure to moisture beyond normal atmospheric humidity.

3. Shock, vibration or other loading beyond rated.

4. Extremes of operation cycle such as long shutdown, frequent starting or reversing.

For lubrication recommendations covering above SEVERE conditions refer to special lube instructions furnished.

For roller bearings refer to special lube instructions.

** For roller bearings 1800 RPM and below and in the absence of other instructions, it is recommended that the above hours be reduced to 1/3 listed values.

8.7 Description of Lubrication

This manual is devoted exclusively to the cause of aiding and promoting the proper lubrication of equipment supplied by Kadant Black Clawson.

The information contained herein has been compiled from a wide variety of sources and has been organized and cross referenced to yield a convenient data source.

It is hoped that through careful use of this document and a scheduled lubrication program, you will obtain the optimum number of productive years from your equipment.

NOTE!

Kadant Black Clawson does not test or approve specific lubricants.
Information contained in this manual is based on Lubricant Recommendation Sheets which have been prepared by several of the leading oil companies.

Description of Lubricant

KBC LUBE #	DESCRIPTION OF LUBRICANT	GENERAL USE
201	A premium grade hydraulic oil rust corrosion and oxidation inhibited. Dispersant, containing foam depressant, not detrimental to synthetic rubber or standard packing materials. Readily demulsified below 125°F (52°C). Viscosity 150-225 SSU @ 100°F (38°C). (Minimum 80 SSU @ 130°F (54°C).	Hydraulic pumps and motors. Vane gear and piston.
210	A non-corrosive, rust resistant, machine oil. Viscosity 125 SSU @ 100°F (38°C).	Air line lubricators. Light oiling applications.
211	A non-corrosive, rust and water wash resistant machine oil. Viscosity 750-950 SSU @ 100°F (38°C).	Anti- Friction bearing reservoirs. General hand and bath oiling on ways, chains, sprockets, and screws.
220	A non-corrosive, rust resistant, high film strength gear lubricant for extreme pressure, gears, and bearings. Viscosity 700-1000 SSU @ 100°F (38°C).	Heavily loaded gears, indrives, transfer cases and reduction units.
255	Special - for oil lubricated bearings operated in the 300 to 400°F (150 to 205°C) range. Consult the specific Lubrication Service Instruction sheets per each application.	
260	A ball and roller bearing grease. Rust, corrosion and oxidation resistant. (NGLI-0)	Anti-friction bearings, screw jacks and other light greasing applications.
261	A ball and roller bearing grease. Water repellent or resistant for operating temperatures 0 to 250°F (-18°C to 121°C). (NGLI-1)	Anti-friction bearings. General hand greasing
262	A ball and roller bearing grease. Water repellent or resistant for operating temperatures 0 to 250°F (-18° to 121° C). (NGLI-2)	Anti-Friction bearings, Ladder bearings General hand greasing.
263	A ball and roller bearing grease. Water repellent or resistant for operating temperature of 250° F to 400° F (121° C to 205° C).	Anti-friction bearings operating at high at high temperatures. (Bearing

KBC LUBE #	DESCRIPTION OF LUBRICANT	GENERAL USE
		speeds to 3000 RPM).
280	VPI - rust inhibitor, crystalline form. Used in powder form or in solution.	For protection of large size Gear boxes during storage.
281	VSO - rust inhibitor, oil compound or concentrate.	For protection gear boxes during storage.
282	Rust preventative, waxy oil compounds 35 to 510 SSU at 100°F (38°C).	For protection of Ferrous metals during storage.
300 SERIES SPECIALS		
300	High temperature anti-seize compound threaded connections.	Bolts and threaded connectors.
301	High temperature, moisture resistant grease. (NLGI-2)	Pelletizer upper bearing.
302	High temperature, heat stable, low speed grease.(Up to 620°F [325°C])	Adjusting thimblespeed on plastic extrusion dies. Mechanical deckles on extrusion dies. Valved adapters located at the heat zone on extruders

Lubricant Suppliers Cross Reference Chart

KBC LUBE #	BURMAH/ CASTROL	CHEVRON USA, INC.	(DARMEX SYNTHETIC)
201	Perfecto T32 or T46	Hydraulic Oil 32 AW Hydraulic Oil 46	:Hydraulic 100/200 <22-32-46-68-100>
210	Perfecto T32 or T46	AW Machine Oil 32 AW Machine Oil 46	Darmex ALO <15-22>
211	Perfecto 68	Vistac Oil 68X	2-46-68-100 Darmex 1050
212	Hyspin VG220 or VG150	Vistac Oil 220X	Darmex 40<150-220>
220	Alpha SP150 or SP220	Chevron NL Gear Compound 220	<150-220-320-460-180 Darmex 9140 Grade 3
255		No Recommendation	771 ND (Oil) Darmex 123 HT (Grease)
260	Spheerol LMM	Polyurea EP Grease 0	Darmex 00
261	Spheerol AP1	Polyurea EP Grease 1	Darmex 123
262	Spheerol AP2	Polyurea EP	Darmex 123
263	WB Grease	SRI Grease 2 or Polyurea EP Grease 2	Darmex 123 HT
280		No Recommendation	Rustex 33
281		No Recommendation	Rustex 22
282		Chevron Rust Preventative	Rustex 33 or 22

< > = ISO VG NUMBER

Lubricant Suppliers Cross Reference Chart

KBC LUBE #	EXXON CO. USA	FISKE BROTHERS	GULF
201	Teresstic 32 or <32>	Lubriplate HO-0 <32>	Harmony 46 AW<46>
210	Teresstic 32 or Esstic 32 <32>	Lubriplate Air Tool Lubricant <32>	Harmony 32 <32>
211	Teresstic 68 Esstic 68 <68>	Lubriplate No. <68>	3-V Harmony 68 <68>
212	Teresstic 150 Esstic 150 <150>	Lubriplate No. 4 <150>	Harmony 150D <150>
220	Spartan 150 <150>	Lubriplate APG-90	EP Lubricant <220>
255		1200-2	No Recommendation
260	Lidok EP0	Lubriplate 630-AAA	Gulfcrown Grease EP # 0
261	Lidok EP1	Lubriplate 630-AA	Gulfcrown Grease EP # 1
262	Lidok EP2	Lubriplate No. 630-2	Gulfcrown Grease EP # 2
263	Unirex N2	Lubriplate EMB	High Temperature Grease
280			
281		Lubriplate Solvent	
282	RustBan 353	No Rust 3	

< > = ISO VG NUMBER

Lubricant Suppliers Cross Reference Chart

KBC LUBE #	IMPERIAL OIL & GREASE CO.	KEYSTONE /PENWALT	LUBRICATION ENGINEERS
201	M/A 943 AW TRIBOL 772	KLC 654 A	Monolec Hydraulic Oil 6110A
210	M/A 943 AW TRIBOL 772	KLC 654 A	Monolec Air Tool 6301
211	M/A MWO-20	KLC 543 KLC 4A	Turbine 6403
212	M/A 814	WG-3 GP 30	Turbine 6405
220	M/A 90	WG-3 Keygear 6 EP	Almasol 607
255	M/A 930 (FLUID) M/A 894 (GREASE)	Zeniplex 2 81 E.P. Light	
260	M/A No. 0	Zeniplex 0 81 E.P. XX Lt.	Almasol 1225
261	M/A 777-1	Zeniplex 1 81 E.P. XX Lt.	Almasol 1225
262	Molub-Alloy 777-2	81 E.P. Lt.	Almasol 1250
263	M/A 894 M/A 860-2	Zeniplex 1	Almasol 1250
280	No Product	No Product	No Product
281	No Product	Keycote 60g	Monolex 2059
282	ASTROL RP		Monolex 2059

< > = ISO VG NUMBER

Lubricant Suppliers Cross Reference Chart

KBC LUBE #	MOBIL OIL CORPORATION	OPTIMOL /OPTILUBE	THE ORE-LUBE CORPORATION
201	DTE 24 <32> DTE 25 <46>	Hydro 5045 <46> Hydro 5035, VB32	111W Product #00230
210	DTE Oil Light <32> DTE Oil Medium <46>	Hydro 5045 Hydro 5035, VG32	Airline Oil Prod. #00218
211	Vactra Oil No. 2 <68> or DTE Oil	Hydro 5095 Hydro MV5065	G10/50 Product #00171
212	DTE Oil Extra Heavy <150> or Vactra Oil	Hydro 5120 Hydro 5150	G10/50 Product #00171
220	Mobilgear 629<150> or Mobilgear SHC 150	Optgear 5120, 5150	G90/140 Product 1 607 #00171
255	Mobil SHC 600 Series ISO Grades Available: 32, 68, 150, 220, 320, 460,680, 1000		Hot Line Series
260	Mobilith AW 0	Longtime PD-0	TS40 Product #00219 TS40 Product #00219
261	Mobilux EP1 Mobilith AW 1	Longtime PD-1	G1/3 Product #10170
262	Mobilux EP2 Mobilith AW 2	Longtime PD-2	#10170
263	Mobiltemp SHC 32 Mobilith SHC 100	Thermogre-2	2HT (Hot Line)
280	No Recommendation		

KBC LUBE #	MOBIL OIL CORPORATION	OPTIMOL /OPTILUBE	THE ORE-LUBE CORPORATION
281	Vaprotec Light or Vaprotec Concentrate		
282	Mobilarama Series		Rust Preventative Light/Medium/Heavy

< > = ISO VG NUMBER

Supplier	Product
KBC Lube No. 300	
Felt Products Corp., Skokia, IL	Felpro C5-A Improved
Molykote, Midland, MI	Molykote GN (Dry Solid Form)
John Crane Packing Co., Morton Grove, IL	General Purpose Thred Gard Cooper Thred Gard Nickel Thred Gard
Lubrication Engineers, Inc., Fort Worth, TX	Almagard 3331
Texaco	API Modified Thread Compound
Fiske Brothers	Lubriplate Hi-Temp.
Keystone/Penwalt	No-Weld #1
Imperial Oil & Grease Co.	M/A 298
Chevron USA, Inc.	Moly Grease 2
KBC Lube No. 301	
Mobil Oil Corporation	Mobility SHC 220, 460, & PM
Lubrication Engineers, Inc., Fort Worth, TX	Almaplex 1275
Texaco	Thermatix EP2
Imperial Oil & Grease Co.	M/A 848 or M/A 894
Chevron USA, Inc.	SRI Grease 2
KBC Lube No. 302	
Dow Corning Molykote	Molykote 41
Keystone/Penwalt	KSL 89
Orelube Corporation	SCMO
Imperial Oil & Grease Co.	M/A 1000
Chevron USA, Inc.	SIL-X Lubricant H

AGMA #	ARCO	BURMAH CASTROL	CHEVRON
1		PERFECTO T-46 Hyspin AWH-46	Chevron GST Oil 46
2	Duro S- 315	Perfecto T-68 Hyspin AWH-68	Chevron GST Oil 68
3	Duro S- 465	Perfecto T-100	Chevron GST Oil 100 Hyspin AWH-100
4	Duro S- 700	Hyspin AWH-150	AW Machine Oil 150
5	Duro S- 1000		220
6	Duro S- 1500	Alpha AN-200	320
7 Comp.		Alpha AN- 320	Cylinder Oil 460 X
8 Comp.		Cresta VA	680X
8A Comp.			1000X

Extreme Pressure

2EP	Pennant NLS-	Alpha SP- 68	NL Gear Compound 68
3EP		Alpha 100	NL Gear Compound 100
4EP	Pennant S-	Alpha 150	NL Gear Compound 150
5EP	Pennant S-	Alpha 220	NL Gear Compound 220
6EP	Pennant S-	Alpha 320	NL Gear Compound 320
7EP		Alpha 460	NL Gear Compound 460
8EP		Alpha 680	NL Compound 680

Straight Mineral

150 SUS @ 55° C (130° F)	Rubilene S-135		
400 SUS @ 38°C (100°F)			
755 SUS @ 38°C (100°F)			
2600 SUS @ 38°C (100°F)			

NOTE: 1) Chevron's AGMA 7 & * are compounded gear oils for worm gears
2) Chevron also carries AGMA 8A & 8A EP products, Chevron gear compound 1000

AGMA #	**DARMEX**	**EXXON**	**FISKE BROTHERS LUBRIPLATE**	
			STM.	HO
1	1050	Teresstic 46		HO-1
2	1050	Teresstic 68	80+	
3	50/60	Teresstic 100	80	HO-2A
4	50/60	Teresstic 150	90+	H0-5
5	9140	Teresstic 220	90-	HO-4
6	140	Teresstic 320		HO-5
7 Comp.	150/160	Cylesstic TK460	140	HO-8
8 Comp.	150/160	Cylesstic TK680	140-	HO-8
8A Comp.		Cylesstic TK1000		

Extreme Pressure

2EP	75	Spartan EP 68	80+	HO-2
3EP	75	Enmist EP 100	80	HO-2A
4EP	9140 700	Spartan EP150	90	HO-3
5EP	9140 1000	Spartan EP220	90-	H0-4
6EP	9140	Spartan EP320		H0-5
7EP	140	Spartan EP460	140	
8EP	140	Spartan EP680	250+	

Straight Mineral

150 SUS @ 55°C(130°F)			STM-75	
400 SUS @ 38°C(100°F)			STM-80	
755 SUS @ 38°C(100°F)			STM-90	
2600 SUS @ 38°C(100°F)				

(-) Viscosity slightly lower than range
(+) Viscosity slightly higher than range

AGMA #	GULF	IMPERIAL OIL & GREASE CO	MOBIL
1	Harmony 46	TRIBOL 772	DTE Oil Medium
2	Harmony 68	TRIBOL 773 M/A 804	DTE Oil Heavy Medium
3	Harmony 90	TRIBOL 774 M/A 80	DTE Oil Heavy
4	Harmony 150D	TRIBOL 776 M/A 814	DTE Oil Extra Heavy
5	Harmony 220	TRIBOL 779 M/A 90	DTE Oil BB
6	Harmony 320	M/A 90	DTE Oil AA
7 Comp.	Transgear Lubricant 680	M/A 140	600 W Cylinder Oil
8 Comp.	Transgear Lubricant 680	M/A 910-	600 W Cylinder Oil (-)
8A Comp.	Transgear Lubricant 800	M/A 1500+	Extra Hecla Super Cylinder Oil (-)

Extreme Pressure

2EP	E.P. Lubricant HD 68	M/A 804	Mobilgear 626
3EP	E.P. Lubricant HD100	M/A 80	Mobilgear 627
4EP	E.P. Lubricant HD150	M/A 814	Mobilgear 629-700
5EP	E.P. Lubricant HD220	M/A 90	Mobilgear 630
6EP	E.P. Lubricant HD320	M/A 690	Mobilgear 632
7EP	E.P. Lubricant HD460	M/A 140	Mobilgear 634
8EP	E.P. Lubricant HD680	M/A 1500+	Mobilgear 636

Straight Mineral

150 SUS @ 54°C (130°F)	Security 53		
400 SUS @ 38°C(100°F)			
755 SUS @ 38°C(100°F)			Vacuoline Oil 128
2600 SUS @ 38°C(100°F)			Vacuoline Oil 146 (-)

(-) Viscosity slightly lower than range
(+) Viscosity slightly higher than range

AGMA #	SHELL	SUN	TEXACO
1	Tellus Oil 46	Sunvis 921	Regal Oil 46
2	Tellus Oil 68	Sunvis 931	Regal Oil 68
3	Tellus Oil 100	Sunvis 951	Regal Oil 100
4	Turbo Oil 150	Sunvis 975	Regal Oil 150
5	Turbo Oil 220	Sunvis 999	Regal Oil 220
6	Turbo Oil 320	Sunvis 9112	Regal Oil 320
7 Comp	Omala Oil 460	Sunvis 9150	Vanguard Cyl. 460
8 Comp	Omala Oil 680		Honor Cyl. 680
8A Comp			650 T Cyl. Oil

Extreme Pressure

2EP	Omala Oil 68nt	Sunep 1050	Meropa 68
3EP	Omala Oil 100	Sunfleet GL-5	Meropa Blend
4EP	Omala Oil 150	Sunep 1060	Meropa 150
5EP	Omala Oil 220	Sunep 1070	Meropa 220
6EP	Omala Oil 320	Sunep 1090	Meropa 320
7EP	Omala Oil 460	Sunep 1110/1130	Meropa 460
8EP	Omala Oil 680	Sunep 1150	Meropa 680

Straight Mineral

150 SUS @ 54°C(130°F)	Vitrea Oil 68	Sunvis 31	Regal 68
400 SUS @ 38°C(100°F)	Vitrea Oil 100	Sunvis 41	
755 SUS @ 38°C(100°F)	Vitrea Oil 150	Sunvis 75	
2600 SUS @ 38°C(100°F)	Vitrea Oil 460	Sunvis 135	

9.0 Service Parts

Your Kadant Black Clawson unit is designed to give trouble free operation with minimum maintenance. However, certain precautions and procedures must be observed in handling, installing, operating, and servicing the unit in order to obtain optimum performance.

The information in this manual should cover most situations. Should questions arise that are not covered in this manual, additional information can be obtained by contacting:

Customer Service
Kadant Black Clawson Inc.
7312 Central Parke Boulevard
Mason, Ohio 45040
Phone: 513.229.8100
Fax: 513.229.8194
Pager: 800.330.7682

Serial Numbers
Serial numbers are assigned at Kadant Black Clawson. This identifying number will be found on the nameplate. It will also appear on the certified drawings. When inquiring about service or maintenance problems, always provide the serial number, size, and type of unit.

Renewal Parts
Refer to the following Recommended Spare Parts List for Start Up or the Recommended Spare Parts List for Two-Year Operations when spare parts are needed.

Recommended Spare Parts List for Start Up

Item #	Qty	Description
1	1	Couch Roll w Bearing (6001530)
2	1	Wire Roll w Bearings (6001531)
3	1	Guide Roll w Bearings (6001532)
4	1	Main Drive Gear Reducer (6001781)
5	1	Repulper Drive Gear Reducer (6001746)
6	1	Worm Gear Jack 15 Ton for Stretcher (6001775)
7	2	Stretcher Jack Nut (6001771)
8	1	Stretcher Drive Coupling (6001761)
9	1	Stretcher Drive GearMotor (6001807)
10	1	1000 MM Cover (6002112)
11	2	1000 MM Deckle (4011913)
12	1	500 MM Cover (6002113)
13	2	500 MM Deckle (4011918)
14	1	Head Box Apron (6001842)
15	2	Repulper Screw Seal Packing (6001684 – Held; 6001683 – Free)
16	1	Vacuum Fan Rotating Assembly (Main Hood) (Ask Kadant for details.)
17	1	Vacuum Fan Rotating Assembly Bearings (2) (Ask Kadant for details.)
18	1	Vacuum Fan Rotating Assembly (Wire Dryer) (Ask Kadant for details.)
19	1	Wire Dryer Fan Bearings (2 ea) (Ask Kadant for details.)
20	1	Repulper Screw (6001664)
21	2	Repulper Screw Bearing (Float & Fixed) (6001684 – Held; 6001683 – Free)
22	2	Repulper Screw Packing (6001795)

Recommended Spare Parts List for Two-Year Operations

Item #	Qty	Description
23	5	Hood Lamp Bulb
24	2	Couch Roll Shaft Lip Seals
25	2	Couch Roll Seal Boots
26	2	Repulper Wire Strip Seal Assembly
27	1	Headbox Apron (6001842)
28	2	Headbox Wire Strip Seal Assembly
29	2	Saveall Wire Strip Seal Assembly
30	1	Wire Dryer Vacuum Blade
31	1	Deflector Blade Repulper
32	42	HP OSC Wire Cleaning shower Nozzle
33	85	Nip Flood / Knock-Off Shower Nozzle
34	85	Nip Flood / Knock-Off Shower Nozzle Gasket
35	1	HP Oscillator Motor
36	1	HP Oscillator Controller Circuit Board
37	8	Stretcher Carrier Rail Bushings
38	6	Hood Viewing Window Glass
39	5	Hood Roof Light Glass
40	10	Liquor Level Sight Tubes
41	2	Wire Tension Controller Air Actuators
42	2	Wire Tension Control Prox Switches
43	2	Auto Guide Air Actuator Bellow
44	4	Auto Guide Needle Bearings
45	2	Auto Guide Fluorcarbon O Ring
46	1	Auto Guide Harden Way Replacement Kit
47	2	Main Fan Drive Bearing
48	2	Wire Dryer Fan Drive Bearing
49	1	Main Fan Drive Coupling
50	1	Wire Dryer Fan Drive Coupling

Table of Contents for
Drawing Section

General Assembly Drawings – 110114B

110114B - General Assembly Elevation
110114B - General Assembly Plan View
110114B - General Assembly Cross Section

Foundation Plan – 110114B-4

Process Flowsheet – 11-10635-01-1D

Specification of Machine Operating Conditions

The pulp to be washed is defined as follows:

Raw Material	Southern Pine
Process	Bleached Kraft
Headbox Consistency	3.0%
Inlet Pulp Temperature	195^{o}F

The Chemi-Washer will operate under the following conditions:

Design Tonnage	Per Drainage Test (170 ADMT/D)
Suction Area	30m^2
Suction Width.	3m
Suction Length	10m
Wire Width	3200mm
Basis Weight	Per Drainage Test (1,300 g/m^2)
Speed	100 fpm
Speed Range	50 – 200 fpm
Wash Liquor Temperature	165°F Minimum
Dilution Factor	1
Wash Stages	7
Vacuum	0 – 42” H_2O
Hand of Machine	Right*

***NOTE: When standing in the Tending Side aisle, facing the machine, the stock travels from left to right.**

UTILITIES AND AUXILIARIES

The following utilities and auxiliaries are to be provided by Customer:

UTILITIES

Electric

Controls	120 volts, 1 phase, 60 hertz

Air Supply

Mill Air	300 cfm @ 50 psi clean and dry
Instrument	50 psi clean and dry

NOTE: Motors - All motors which are a part of this contract will be supplied less starting equipment. All motors not specified in this contract will be furnished by customer.

Framing – 6001529

Side Beams
The horizontal box section side beams are constructed of 304 stainless steel and extend from the breast roll bearing bracket to the couch roll support column. These beams, one at the tending side and one at the drive side, provide support for the suction table, mount the breast roll bracket, couch roll column, inside wire roll, wire tension control and guide control.

Consist of:

2 each main 11 X 18” box beams in 304 stainless steel material
1 each tension mechanical pedestal
1 each wire guide pedestal
Couch roll column
Couch roll bearing brackets
Breast roll bearing brackets

Couch Roll – 6001530
Wire Roll – 6001531
Guide Roll – 6001532

There are five (5) rolls on the Chemi-Washer. The rubber cover hardness is 20 ± 3 P & J. The rolls are described below.

Couch Roll
The Couch Roll provides the wire turning point at the discharge end of the Chemi-Washer. Its bearing housings are fixed mounted to the sides of vertical columns. Diameter = 38.5" (977.9mm).

Breast Roll (6001531)
The breast roll provides the turning point for the wire at the headbox end of the Chemi-Washer. Diameter = 20.25" (514.4mm)

Stretcher Roll (6001531)
The stretcher roll is carriage mounted to provide the proper amount of tension to be applied to the wire system. Diameter = 20.25" (514.4mm)

Wire Roll
Diameter = 20.25" (514.4mm)

Guide Roll
The guide roll is mounted in an automatic guide to keep the wire "on track". The roll is interchangeable with all the rolls of like diameter, but the bearing housings and seal ring are designed for angular displacement and unique to this position.
Diameter = 20.25" (514.4mm)

Recommended Spares
It is recommended that the mill have one (1) wire roll complete of each diameter with bearings and housings as spares. This would include a Tending Side and Drive Side Guide Roll bearing assemblies recommended as spares.

OEM couch roll 23044CCK.pdf
OEM couch roll SAF 044 KA.pdf
OEM couch roll SAF 044KA-data sheet.pdf
OEM couch roll SNW 3044.pdf
OEM guide roll 6028.pdf
OEM wire roll 2228 + H3128.pdf
OEM wire roll SNL528.pdf
OEM SKF-housing.pdf

Suction Table – 6001533

Suction Boxes
The Chemi-Washer section contains a total of nine (9) stainless steel suction zones, two (2) for formation and seven (7) for washing, which are mounted from the horizontal side beams. The drive side of the zone boxes extend out past the side beam and have flanges for connection to the vapor system on top and the liquor drains on the bottom.

Vacuum System
One fan will serve all of the suction zones. This will be discussed in a later section.

Sight Tubes
Each of the suction zones has a sight tube at the drive side. These tubes facilitate calibration of your vacuum compensated level controls by allowing you to observe the liquor level.

Suction Box Covers and Deckles – 6001534

Covers
Covering the complete washing table are covers mounted over the zones supported by the Suction Boxes. These covers are made of ultra high molecular weight (U.H.M.W.) polyethylene designed to allow free drainage with a low co-efficient of friction (drag effect) on the wire.

NOTE: At operating temperatures over 180°F (82°C) at one installation using a napthalenic oil based defoamer, the covers were observed to swell due to absorption of the oil. Laboratory experiments confirmed this fact. While the swelling was reversed and the covers returned to their original dimensions after use of the napthalenic oil was discontinued, Kadant Black Clawson recommends avoiding that type of product if you choose to run defoamer at all.

Deckles
Running along the length of the table on both the Tending Side and Drive Side are the deckle assemblies. These are mounted in conjunction with the suction box covers.

The deckle is of the curved design made of high molecular weight virgin polyethylene (U.H.M.W.).

Hood – 6001535

The Chemi-Washer Hood enclosure is mounted above the Chemi-Washer wire and extends all the way from the headbox to the Couch roll end of the suction table.

The tending side has seven (7) windows. Six (6) hood lights are mounted in roof panels. This allows for observation of the washing process while the machine is running. The hood can be entered to allow access during wire stringing and other maintenance operations through a mandoor.

Hood panels can be easily removed, by loosening bolts, for wire change, shower cleaning or maintenance.

!!!WARNING!!!
ALWAYS VENT HOOD BEFORE ENTERING AND LOCK-OUT

Vapor System Equipment. (Also see Drawing Section 9.)
One (1) centrifugal fan is connected so as to draw air out of the suction zones and recycle it back into the hood. It is the pressure differential between the hood and the suction zones that causes liquor to pass through the stock and into the zones. Since the pressure differential is not large, about 25"to 41" H_2O, air is drawn through the stock at a relatively low velocity.

The pressure inside the hood is nominally atmospheric, depending on the desired washer operation. In any case, the magnitude of this positive or negative pressure will be very slight, generally less than 1/4" H_2O.

The damper located at the fan inlet provides motor stall protection during start-up and hood venting operations. This should be closed during the initial start-up to prevent fan motor overload.

During operation, only the zone control valves should be throttled, controlling the vacuum applied to that suction zone to the desired position. The desired position is one that puts the dry line about midway down that particular zone.

Gas Piping – 6001536

The vapor system on the Chemi-Washer is comprised of a Gas Piping Assembly with "*TORNADO*" Integral Mist Eliminators and an Air System with one (1) Robinson Fans as shown on the process flowsheet.

Reference is made to Robinson's Pre-Installation Manual Operation and Maintenance Instructions. (See Drawing Section 20.) For "Safe Practices" recommend all personnel near air moving devices see AMCA publication 410, enclosed.

AMCA Publication 410-96.pdf

OEM Robinson Fans O & M Manual 1204742.pdf

Stretcher & Drive – 6001537, 6002135

Stretch – 6001537
Tensioner – 6002135

Wire tension measurement and control is accomplished by using two Firestone Airstroke Actuators that are mounted on the “inside wire roll” stand. This tension stand is located on the drive side of the machine near the headbox.

The set-up height for both Airstroke Actuators is determined by centering the air bag swing arm between stops. The top Airstroke Actuator acts to compensate for wire tension to maintain a level roll. The bottom Airstroke Actuator is maintained with a specified pressure (See Drawing Section 21 Air Bag Calibration Curve) just to lift the roll to center. The linkage is then adjusted so the trip lever is centered between the two proximity switches with no wire tension.

The recommended slack wire tension is 41.5 PLI. In order to maintain a wire tension of 41.5 PLI, the top actuator must be inflated per Air Bag Calibration Curve.

Settings for the wire tension and top air bag pressure are graphed on the calibration curve. (See Drawing Section 21.)

When tension is increased, the top Actuator will compress causing the decrease proximity switch to sense the lever's motion, which activates the wire stretcher mechanism. The stretcher roll will move to decrease tension until the top Actuator inflates and returns to its normal position and the lever centers between the proximity switches.

When tension is decreased, the top Actuator will inflate causing the increase proximity switch to sense the lever's motion, which activates the wire stretcher mechanism. The stretcher roll will move to increase tension until the top Actuator compresses and returns to its normal position and the lever centers between the proximity switches.

OEM SEW Eurodrive Stretcher Drive AC Motor AC Brake Motors Terminal Box 084020108_en.pdf
OEM SEW Eurodrive Stretcher Drive AC Motor Gear Unit Version 082630507_en.pdf
OEM SEW Eurodrive Stretcher Drive Instructions.pdf
OEM SEW Eurodrive Stretcher Drive Parts List Helical Gear Unit 012511096_en.pdf
OEM SEW Eurodrive Stretcher Drive Technical Note GM-008-02.pdf
OEM Joyce Machine Jacks Stainless Steel Machine Screw Jack O&M.pdf

Guide – 6001538

General
The wire guide roll is mounted in anti-friction bearings with its rear side mounted on a support stand. The tending side is mounted in a pneumatic guide unit. This allows the tending side of the roll to move in the machine direction while the rear end pivots but remains in its fixed position.

The position of the guide is normally under automatic control through the Auto Guide and Controller Assembly which is mounted just ahead of the guide roll.

Important information pertaining to your guide system:

Wire Guide	M2SST
Operation	Automatic with Manual Hand Guide for Centering

Guide Roll Stand with Hand Guide Assembly

Refer to the supplier information following in this section.

OEM Operation and Maintenance Manual Wire and Felt Guilding Specs GLVSHGuideR08-WIP.pdf

Repulper – 6001539
Repulper Drive – 6001540
Repulper Hood and Sealing – 6001541

Removable seal plates allow access to the wire and Nip Flood Shower. The repulper hood will be removed during couch roll removal.

Repulper
Encloses the couch Roll and utilizes a screw flight conveyer to direct washed pulp towards the discharge. The pulp sheet deflector blade is housed in the upper trough of the repulper. Adjustment of the blade is done on the exterior of the repulper.

Repulper Drive
Consist of an electric motor (by customer) in combination with a gear reducer to drive the Repulper Screw.

Repulper Hood and Seal
The upper portion that encloses Repulper and is the interface between the main Chemi-Washer hood and the Repulper.

OEM SEW Eurodrive Repulper Drive Parts List Adapter 232710200_EN.pdf

OEM SEW Eurodrive Repulper Drive Parts List Helical Gear Unit 012540996_en.pdf

OEM SEW Eurodrive Repulper Drive R Series Dimension Sheets Constant Speed Gear Reducers R97AM.pdf

Headbox and Headbox Piping – 6001542
Headbox Sealing – 6001543

The Chemi-Washer has a headbox designed to ensure optimum flow and dispersion of stock onto the Chemi-Washer wire. It was designed and engineered to meet the following flow requirement.

Normal operation = 160 ADMT/D @ 3.0% consistency

Stock is pumped to the main supply header. This header feeds a manifold of vertical pipes.

A seal strip runs across the bottom of the headbox. This strip provides a seal between the headbox and the top of the wire. The headbox is sealed directly to the Chemi-Washer hood but not connected to it to allow for thermal expansion of the suction table.

There are small removable access ports on the headboxes explosion chamber for cleaning.

The headbox is retractable for roll removal and seal replacement.

Wire Cleaning Showers and Save-All – 6001544

High Pressure Oscillating Shower

One (1) Wire Cleaning Shower - Inside Wire: 6002087
Electromechanical oscillated, 6" stroke. The needle point nozzles are directed perpendicular to the oncoming double layer fabric. Tending side end of shower has a 1" NPTF threaded flush valve for clean out which is plumbed into the save-all. Drive side has a 1.5" NPTF high pressure flexible supply line hose 105" long. All material is 316L Stainless Steel and polypropylene. Rated flow is 22.79 gpm at 350 psi with 42 needle jets, 0.040” orifice. The shower is located as the second shower in the Save-All.

Couch Roll NIP Flooding Shower and Knock-off Shower

One (1) NIP Flooding Shower: 6002085
This shower is stationary. The fan nozzles are directed precisely into wire-to-couch roll nip. Tending side end of shower has a 1” NPT threaded flush valve for clean out which is plumbed into the Save-All. Drive side has a 2.5” NPTM threaded connection and requires no flexible connection. All material is 316L stainless steel and polypropylene. Rated flow is 102.5 gpm at 110 psi with 31 -30° fan nozzles, 0.125” orifice.

One (1) Knock-Off Shower: 6002086
This shower is stationary. The fan nozzles are directed perpendicular to the wire. Tending side end of the shower has a 1” NPTF threaded flush valve for clean out which is plumbed into the Save-All. Drive side has a 2.5” NPTM threaded connection and requires no flexible connection. All material is 316L stainless steel and polypropylene. Rated flow is 130.7 gpm at 150 psi with 39 - 45° fan nozzles, 0.110” orifice.

For more information on Kadant Solutions Showers concerning installation instructions and maintenance refer to the technical literature and engineering drawings in this section. Special attention must be paid to the manual brush cleaning system utilized to maintain shower nozzle operating cleanliness.

IMPORTANT!

Customer should insure water cleanliness specification noted on the tabulation of the Process Flow Sheet 11-10635-01-1D and provide adequate filters to maintain shower nozzle design performance. These showers should be manually cleaned using internal brush as described in the Kadant Solutions manual at least once every eight (8) hours.

OEM 514152 KBC Shower Manual.pdf

Wash Liquor Showers – 6001545

The pulp mat is washed by a series of Wash Liquor Showers located in the Chemi-Washer. The Chemi-Washer has seven (7) Wash Liquor Showers (i.e., seven-stage washing). The first stage shower utilizes a counter-current flow of wash liquor starting with fresh make up water from the seventh stage shower and routing it back counter currently via wash liquor transfer pumps.

Each shower is designed for a liquor flow of 230 gpm during normal operation.

Each shower consists of a pipe in pipe design which attaches to the machine through the drive side of the hood. Liquor is pumped into the 7th through 1st stage showers from the transfer liquor pumps which are located below the Chemi-Washer.

As the liquor is pumped into the shower it flows through orifices located on the top of inner pipe. The fluid then fills the space between the inner and outer pipe distributing flows.

Finally, the liquor passes through drilled holes in the bottom of the outer shower pipe and into the weir pan located directly below the pipe. It then flows into the pond. When the pond becomes full, the liquor flows over the weir and onto the pulp.

Footwalks and Stairs – 6001546

The Chemi-washer is supplied with personnel access footwalks on the tending side of the machine. The footwalks are supplied with a non-conductive fiberglass non-slip grate-style floor and stainless steel handrails that are removable to allow for wash liquor shower pipe removal.

The safety handrails for mounting on the machine operating floor are also stainless steel and removable to allow for under-machine access and maintenance.

Wire Change – 6001547

The following is offered as a procedure for stringing a new fabric (wire) onto the Chemi-Washer.

1. Close the Chemi-Washer Pulp Feed Valve.
2. Flush Headbox and Chemi-Washer feed piping with liquor or dilution water for one minute or until flow is free of pulp to prevent plugging.
3. Shutdown the knock-off shower pump, and the high pressure wire cleaning shower pump.
4. Close the last stage shower wash water valve.
5. Shutdown the Save-all pump.
6. Shutdown the interstage filtrate pumps.
7. Bring the wire speed to zero feet per minute.
8. Shutdown nip flood shower.
9. Open hood mandoor to allow air to enter the hood.
10. Drain Suction Table
11. Switch fan to vent mode and run fan until conditions in the hood are safe for entry. Kadant Black Clawson recommends that the fan remain running to provide hood ventilation, should personnel enter the hood. Check any applicable mill safety procedures before entry.
12. Open repulper and save-all inspection doors. (if required)
13. Remove the wire guide palm assembly. Set this unit aside in a safe location where it will not be damaged.
14. Move the stretcher roll to its wire change position.

15. Gently guide the fabric around the rolls from the bottom of the machine so that both ends of the fabric are under the machine. This can be done by stringing a rope or belt strap around the rolls or attaching the new wire to the end of the old wire and using the drive system to pull the new wire through (belt strap recommend).

16. Install pin through loop using the top of the wire shipping crate.

17. Re-assemble machine by reversing steps 13-15.

18. Check wire guide for proper operation & wire tracking. Re-adjust palm guide if required.

USE CARE TO AVOID SNAGS AND POSSIBLE DAMAGE TO THE NEW FABRIC

Fabric Care

For maximum service life and best overall fabric performance our fabric suppliers recommend that the following instructions be followed carefully when using fabrics on Chemi-Washer.

Fabric Storage

Fabrics should be kept in dry storage at temperatures below 77°F (25°C)

If fabrics are stored in high temperature they may shrink to the point where they are too short to be installed on washer.

Nylon fabrics absorb water and shrink when getting wet under no tension condition.

Keep heavy materials off wires.

Installation

Keep nylon fabric dry during installation.

Ensure that fabric is not pulled over any sharp points which could damage fabric during installation.

Check that fabric is straight in machine (line on fabric straight across machine)

Start up

Ensure that fabric lies flat without wrinkles before putting tension on fabric.

Put low tension on fabric.

Put 110°F (43°C) water on fabric and start rotating, at 10 FPM.

When fabric is wet, put more tension on fabric increasing it slowly.

During first few hours of operation fabric will shrink in cross machine direction and stretch in machine direction. After approximately 24 hours fabric should have reached final size.

Care during use

Ensure that fabric cleaning showers are in good condition and that effective cleaning is achieved across full width of fabric at all times.

Look for machine directional discoloration of fabric which could indicate that a foreign object or a sharp point of the machine is causing wear on fabric.

Look for holes in fabric. Holes must be repaired when they are small either by using PVC glue (small holes with max. diameter of 1/8" (3 mm) or by sewing with nylon yarn. PVC glue type of glue used to connect plastic sewage piping.

If fabric edge starts to fray, remove loose yarns and apply PVC glue to fabric edge.

Do not allow fabric to run out from machine. This inevitably causes wrinkles in fabric which are almost impossible to iron out.

Shutdown

Short periods

If possible, fabric should be kept wet (nylon fabric), under tension and rotating.

Longer periods

As above if possible.

If not, ease off fabric tension slowly and leave fabric in an untensioned position.

If fabric shrinks during shutdown - nylon fabric tends to shrink - ensure that fabric tension does not increase dramatically.

Wire removal

Cut full CD sample 12" (304.8mm) x 45" (1143.0mm) and send to supplier for post evaluation.

NOTE: It is essential that these instructions be adhered to when working with nylon material.

Nylon material, although heat stabilized during the production process, is a "live" material. Nylon material absorbs water and shrinks if allowed to. Nylon material also reacts to high temperature by shrinking.

Keep heavy materials off wires in storage, recognizing prolonged contact will result in impressions being "memorized" on plastic woven surfaces.

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Roll Removal Equipment – 6001548

The following pages contain suggested procedures for removing the rolls from the machine. These are only suggested procedures and may be improved upon as personnel become familiar with the equipment. Keep in mind however, that a faster procedure is not necessarily a better one if safety is forsaken to achieve speed.

These rolls are heavy and expensive and should be treated the same as any other piece of expensive equipment to prevent damage to the roll or surrounding equipment.

Always keep safety as the guiding factor when working around this equipment and devising "better" procedures.

Before proceeding with Roll Removal, a few general notes are in order regarding these procedures. Review these carefully before reading on.

- These procedures assume the wire has been removed.
- Rolls should be wrapped with a protective covering to prevent damage to the surface when slinging and moving.
- Do not set rolls directly on ground or Chemi-Washer operating floor. Always use roll carts provided and/or overhead crane for supporting rolls.
- Until personnel becomes familiar with the equipment, perform roll changes slowly, analyzing each step carefully before it is performed to ensure maximum safety and minimize the possibility of damage to equipment.
- Keep hands and toes away from places where they can be pinched. Do not exceed the capacity of cranes and other lifting equipment.
- Keep out from under suspended rolls or other equipment while being raised or moved.
- When belly banding rubber covered rolls, use bands of sufficient width to prevent damage to the rubber covering.
- Use belly bands having proper weight capacity. See Roll Weight Chart on the next page.

Roll Weight (includes bearings)

Couch Roll - 9,057 lbs or 40.29kg
All Other Rolls - 3542 lbs or 15.76kg

ALL ROLLS

1. Follow procedures outlined on Drawing Section 18 for roll removal.

2. Always center the roll on the removal carts.

3. All under-machine rolls can be extracted from under the machine in a manner similar to that illustrated on Drawing Section 18.

4. To re-install a roll, simply reverse.

NOTE: See Drawing Section 5 for Roll Detail.

Drive – 6001549

The Chemi-Washer Drive System is electrically driven.

Safety considerations unique to each Chemi-Washer installation make it impractical to provide exact locations for the four (4) additional Emergency Stop Push Buttons supplied by Precision Fluidpower Engineered Systems.

These Emergency Stop Push Buttons should be installed on the tending and drive sides, near the breast roll and near the couch roll for use by operators who, in an emergency may witness personnel near hazardous moving equipment and exposing themselves to unsafe conditions. Kadant Black Clawson recommends that the customer's mill safety committee study the specific Chemi-Washer installation and select the location for these four (4) Emergency Stops.

OEM SEW Eurodrive Main Drive K Series Dimension Sheets Constant Speed Gear Reducers K-KH187BAM.pdf

OEM SEW Eurodrive Main Drive Parts List Helical-Bevel Gear Unit 332580599_en.pdf

OEM SEW Eurodrive Main Drive Parts List Adapter 232720200_EN.pdf

OEM SEW Eurodrive Gearmotors and Gear Reducers Operating Instructions.pdf

OEM SEW Eurodrive Maintenance Series -Replacing a Stator StatorReplacementStoryboard.pdf

OEM SEW Gearmotors Reducer Service And Maintenance.pdf

Air System and Main Fan (6001550)

The Robinson Fan supplied with the Chemi-Washer is Model DA-55RB1806-106.

Casing
Heavy welded construction, AMCA, stiffeners 304L stainless steel, flanged and gasket split design for removing impeller, inlet and discharge flanges, drain at lowest point of casing, cap and access door.

Combination Base Plate
Welded combination base plate for casing, bearing system and motor, mild steel sand blasted and epoxy finished.

Impeller
Backward inclined, straight blade, single inlet, diameter
55”ϕ x 7/8” (1397mm x 22.2mm), dynamically and statically balanced, material 316L stainless steel, welded construction.

Shaft
Material 316 stainless steel.

Bearings
Two heavy duty spherical roller bearings, 1- Fixed, and 1 - Floating. Grease lubricated (Dodge USAF # 035766, 2 7/16”ϕ)

Drive
Direct driven with coupling and guard included.

Motor
1800 RPM, 50HP by customer

PERFORMANCE DATA (Robinson Curve)

Conveyed gas:	Vapor
Speed:	1780 RPM
Sound Data	See Robinson Operation and Maintenance Instructions

AMCA Publication 410-96.pdf
OEM Robinson Fans O & M Manual 1204742.pdf

Control E&I – 6001551 (6002181.pdf, 6002182.pdf)

Part Number	Qty	Revision	Description
6002182	1	A	CONTROL E&I ASSEMBLY
6002181	1	-	CONTROL E&I ASSEMBLY
6002165	1	-	CONTROL PANEL-WIRING DIAGRAM
6002163	1	-	HORN MOUNTING PLATE
6002162	1	-	HORN
6002160	1	-	SPEED SENSOR
6002156	2	-	LIMIT SWITCH: WIRE RUN-OFF
2002021-001	4	-	NUT: HEX - M6 X 1.0
1078007-006	4	-	HEX HEAD CAP SCREW - M6-6G X 20.0 LG.
1078006-010	20	-	HEX HEAD CAP SCREW - M5-6G X 30.0 LG.
1077960-007	4	-	PREVAILING TORQUE HEX NUT: ALL METAL - M10-1.50
1077960-003	4	-	PREVAILING TORQUE HEX NUT: ALL METAL - M5-.80
1076806	6	A	PLAIN WASHER - M10
1076804	2	A	PLAIN WASHER - M6
1043305	6	B	HEX HEAD CAP SCREW - M10-6G X 20 LG
6002283	1	-	AIR BAG CALIBRATION CURVE (PLI vs PSI)
6002184	5	-	PROXIMITY SWITCH
6002183	1	-	LOGIC DIAGRAM-ELECTRIC DRIVEN
6002180	1	-	PANEL STAND
6002179	1	-	TENSION SUB-PLATE
1513185	1	-	NAMEPLATE: LOWER AIR BAG 2.5" WIDE X 1.5" TALL X .06" THK TAG WITH .25" HIGH LETTERS: MARKED "LOWER AIR BAG"
1513184	1	-	NAMEPLATE: UPPER AIR BAG 2.5"WIDE X 1.5" TALL X .06 THK TAG WITH .25" HIGH LETTERS: MARKED "UPPER AIR BAG"
6002159	2	-	FILTER/REGULATOR
6002158	1	-	GAGE-PRESSURE TRANSDUCER
6002155	1	-	PRESSURE SWITCH
1076855	2	A	HELICAL SPRING LOCKWASHER - M8
6002396	2	-	HEX HEAD BOLT M8 X 1.25 X 30.0mm LG
6002178	1	-	WIRE LIMIT SWITCH ASSEMBLY: DS
1076760	4	C	HEAVY HEX FULL NUT - M24-6H
1076757	2	C	HEAVY HEX FULL NUT - M12-6H
1043410	2	B	HEX HEAD CAP SCREW - M12-6G X 40 LG
1510802	17.52	-	THREADED ROD - M24-6G
6002164	1	-	MOUNTING BLOCK
1077941-002	2	-	NYLON INSERT LOCKNUT - M4-.70

Part Number	Qty	Revision	Description
1076857	2	A	HELICAL SPRING LOCKWASHER - M12
1076810	2	A	PLAIN WASHER - M24
6002395	2	-	SOCKET HEAD CAP SCREW: M4 X 0.7 X 70mm LG
6002171	1	-	BRACKET: RUN OFF SWITCH: DS
6002177	1	-	WIRE LIMIT SWITCH ASSEMBLY: TS
1076810	2	A	PLAIN WASHER - M24
1076760	4	C	HEAVY HEX FULL NUT - M24-6H
1076757	2	C	HEAVY HEX FULL NUT - M12-6H
1043410	2	B	HEX HEAD CAP SCREW - M12-6G X 40 LG
1510802	17.52	-	THREADED ROD - M24-6G
6002170	1	-	BRACKET: RUN OFF SWITCH: TS
1077941-002	2	-	NYLON INSERT LOCKNUT - M4-.70
1076857	2	A	HELICAL SPRING LOCKWASHER - M12
6002395	2	-	SOCKET HEAD CAP SCREW: M4 X 0.7 X 70mm LG
6002176	1	-	WIRE GUIDE SUB-PLATE
6002175	1	-	INTERCONNECT: FIELD-EMO III OSCILLATOR
6002174	1	-	PANEL: EMO III CONTROL
6002173	1	-	SCHEMATIC: EMO III PANEL
6002172	1	-	HOOD LIGHT WIRING DIAGRAM: 6 LIGHTS
6002169	1	-	SENSOR MOUNTING BRACKET ASSEMBLY
1076804	2	A	PLAIN WASHER - M6
2002021-001	2	-	NUT: HEX - M6 X 1.0
1078007-006	2	-	HEX HEAD CAP SCREW - M6-6G X 20.0 LG.
6002168	1	-	SENSOR BRACKET
6002167	1	-	CONTROL PANEL-PANEL LAYOUT & MATERIALS
1510197	1	-	CORPORATE NAMEPLATE: KADANT - 12 X 3
6002166	1	-	CONTROL PANEL-SIGNALS TO DCS SYSTEM
6002186-006	1	-	INSERT WRAP - REPULPER T.S.
6002185-006	1	-	MAGNETIC WRAP - INSIDE WIRE D.S.
6002387	4	-	HEX HD CAP SCREW: M10 X 1.75 X 20mm LG

OEM Electrical Cut Sheets.pdf

Nameplate and Safety Sign – 6001552

Sheet Deflector – 6001956

Deflector is designed with a polyethylene blade.

The Repulper Sheet Deflector Assembly, located inside the repulper trough is accessible only by removal of the repulper hood and couch roll. The deflector blade is clamped to the blade holder and can be slid out of the repulper thru access doors on either side after unclamping. Jack screw adjustments at each side (outside of the repulper) are used to raise or lower the blade for positioning. The blade should contact the wire but not deflect it.

OEM IS10 Basic Guide for Installation-maintenance-troubleshooting Doctor Equipment.pdf

OEM IS103 Bolt Torque Specifications.pdf

Wire Vacuum Fan – 6001554

The Robinson Fan supplied with the Chemi-Washer is Model DA-23RB1610-100.

Casing
Heavy welded construction, AMCA, stiffeners 304L stainless steel, flanged and gasket split design for removing impeller, inlet and discharge flanges, drain at lowest point of casing, top and access door.

Combination Base Plate
Welded combination base plate for casing, bearing system and motor, mild steel sand blasted and epoxy finished.

Impeller
Backward inclined, straight blade, single inlet, diameter
23½”ϕ x 15/16” (597mm x 23.8mm), dynamically and statically balanced, material 316L stainless steel, welded construction.

Shaft
Material 316 stainless steel.

Bearings
Two heavy duty pillow block bearings, 1- Fixed, and 1 - Floating. Grease lubricated (Dodge Grip-Tight # 129179 and # 130693 for 1 11/16”ϕ shaft)

Drive
Direct driven with coupling and guard included.

Motor
3600 RPM, 15HP by customer

PERFORMANCE DATA (Robinson Curve)

Conveyed gas:	Vapor
Speed:	3600 RPM
Sound Data	See Robinson Operation and Maintenance Instructions

OEM Robinson Fans O & M Manual 1204742.pdf