INSTALLED 6/6/06

KADANT
BLACK CLAWSON

7312 Central Parke Blvd.
Mason, OH 45040
Tel: 1.513.229.8100 Fax: 1.513.229.8194

HYDRAPURGE III 51-2500 MANUAL

Installation, Operation, Maintenance, and Service Parts

Deliver manuals to:

Ponderay Newsprint Company
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Attention: Mr. Todd Behrend

Customer order number: 079901	Number of Manuals: (3)
Shop order number	Serial number
65562A	05-HP51-2500-0308

Read this manual carefully to learn how to operate and service your equipment correctly; failure to do so could result in personal injury or equipment damage. Keep this manual readily accessible and legible to anyone doing maintenance on or operating this equipment.

Thank you for purchasing Kadant Black Clawson products

KADANT
BLACK CLAWSON
Celebrating 130 Years
1873 - 2003

611MN-0

EQ # M290-0017

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Manual Overview

This manual is for general information and guidance. For specific information concerning parts or items, refer to the certified drawings of the equipment.

Your Kadant Black Clawson unit will provide many years of dependable service when installed, operated, and maintained according to our recommended procedures. The instructions in this manual are recommended procedures for installing, operating, and maintaining your unit. Correct installation of the unit is critical. Reasonable operation and maintenance will not compensate for poor installation.

All information, illustrations, and specifications in this manual are based on the latest information available at the time of publication.

Drawings in this manual are only sketches that exist for no other purpose other than to provide a visual reference for the text within this manual. The drawings in this manual are not to be used for construction purposes.

It is the responsibility of the purchaser of this equipment to make sure that operators, maintenance personnel, and anyone else involved with this equipment is aware of this manual, has easy access to this manual, and has read and understands the contents of this manual. It is also the purchaser's responsibility to keep this manual in legible condition.

WE RESERVE THE RIGHT TO MAKE CHANGES AT ANY TIME WITHOUT NOTICE.

Kadant Black Clawson Inc.
7312 Central Parke Boulevard
Mason, Ohio 45040
phone: 1-513-229-8100
North America emergency 24-hour service: 1-800-448-5422
global emergency 24-hour service: 1-888-535-3993
fax: 1-513-229-8197

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1.0 SAFETY

1.1 SAFETY INTRODUCTION

This manual is a guide for safe and trouble-free installation and operation of your Kadant Black Clawson equipment. Follow the recommendations in this manual to ensure the safety of your personnel along with the dependable operation of your Kadant Black Clawson equipment. Your particular situation may require additional procedures and safety measures.

You--the purchaser of this equipment--are responsible for ensuring that your personnel are trained in the safe operation and maintenance of this equipment. We recommend that your personnel obtain refresher sessions covering safety, operation, and maintenance procedures 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.

FOLLOW THE SAFETY INFORMATION IN THIS MANUAL



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 unit is at zero mechanical state (ZMS).
- Keep safety signs in good condition, clean, and legible.
- 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 instructions.
- Keep your machine in proper working condition.
- Do not modify the equipment without written authorization from Kadant Black Clawson. Unauthorized modifications may impair the function, shorten the machine life, and/or render built-in safety features useless.
- Inspect the unit before starting and make sure that the following conditions are met:

    - All guards and covers are in good condition and fastened in place.

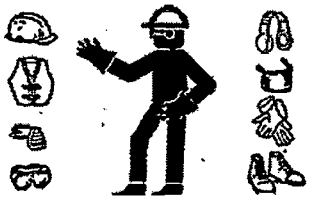
    - No parts are loose, worn, damaged, or missing.

    - All personnel are clear of equipment.

Safe Maintenance Overview



- 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.



- 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 the guidelines and instructions below and throughout this manual. If you have any questions, contact your supervisor.

Safety Guidelines

HAZARD	WHAT COULD HAPPEN	PREVENTION
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.	**WARNING** Skin contact with stock might result in chemical or thermal skin reaction, such as skin irritation or scalding.	Follow shut down guidelines. Bring unit to ZMS. Tighten or replace loose, leaking connections.
Valves - air and electrically operated.	**WARNING** Amputation or severe injury to fingers, hands, or arms, could result.	Lockout valves and their energy sources and ensure that equipment is at zero mechanical state (ZMS). **NOTE: Controls may not be independent.** Extreme care must be used when isolating power sources. Be sure of what will shut down when energy sources are locked out. Make sure that other automatic equipment connected to source will also shut down. Do not insert fingers, hands, arms, head, or and other body parts into such devices.

HAZARD	WHAT COULD HAPPEN	PREVENTION
Motor/drive units	**WARNING** Amputation or severe injury to fingers, arms, or hands could result.	Do not expose electrical units to water. Shut down and lockout unit before cleaning or servicing. Do not operate the unit with covers, hoods, or guards removed. Note: Manual rotation of rotating elements may be required with enclosures removed. Be sure all personnel are clear of unit before manually rotating rotor.
Exceeding design pressure of unit.	**WARNING** Seals, gaskets, or the vessel might fail and cause severe personal injury.	Know the correct design pressure of the equipment. Refer to the manual and the certified drawings. Adhere to proper operating procedures.
Discharged debris from trash chamber.	**WARNING** Cuts, abrasions, skin irritation, and scalding could occur.	Wear eye protection and protective clothing.
V-belts/sheaves, drive shafts	**WARNING** Amputation or severe injury could occur.	Do not operate unit with guards removed. Be sure unit is shut down and lockouts are in place before installing guards that have been removed.
Visually inspecting a plugged pipe	**WARNING** Severe injury or death could occur.	Never look into a plugged pipe. A discharge could seriously injure you.

HAZARD	WHAT COULD HAPPEN	PREVENTION
Manual dump valve (hand operated contaminant discharge)	**WARNING** Cuts, abrasions, skin irritation, and scalding could occur.	Don't stand where you can be splashed. Wear eye protection and protective clothing. Additional piping may be required to dump contaminants into dumpster. Be sure placement does not require personnel to be in dumpster to open or close valve.
Confined space	**WARNING** Severe injury or death could occur.	Do not enter the unit.
Automatic dump valve (air or electrically operated contaminant discharge valve). Depending on the panel you use, this warning may or may not be applicable.	**WARNING** Cuts, abrasions, skin irritation, and scalding could occur.	Don't stand where you can be splashed. Wear eye protection and protective clothing. Signs should warn of automatic dumping and instruct not to enter port until unit is shut down, brought to a zero mechanical state, locked out, and tagged. The outlet from the valve must be guarded to prevent anyone from reaching into dump port. The valve is normally closed when the unit is in operation. At the end of the cycle, the valve will open and automatically dump contaminants with no warning. This discharge port may also blind-over or clog.

1.3 SAFETY PRACTICES

Post the laminated safety sign (provided by Kadant Black Clawson and pictured below) in plain view on or near the equipment at installation and keep it clean.

SAFETY INSTRUCTIONS

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, chemical 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 services are not independent of the main supply, DO NOT PROCEED--contact your supervisor.

d) Place or attach a "DANGER - PERSONNEL WORKING" sign near lockout.

e) BLOCK any rotating elements to prevent accidental rotation.

4. DO NOT ENTER vessel or unit unless you have at least ONE OTHER PERSON OUTSIDE the unit at all times. Certain vessels require use of harness, gas masks, and other specialized safety equipment.

5. Upon completion, follow the START UP PROCEDURES in this 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 your supervisor.

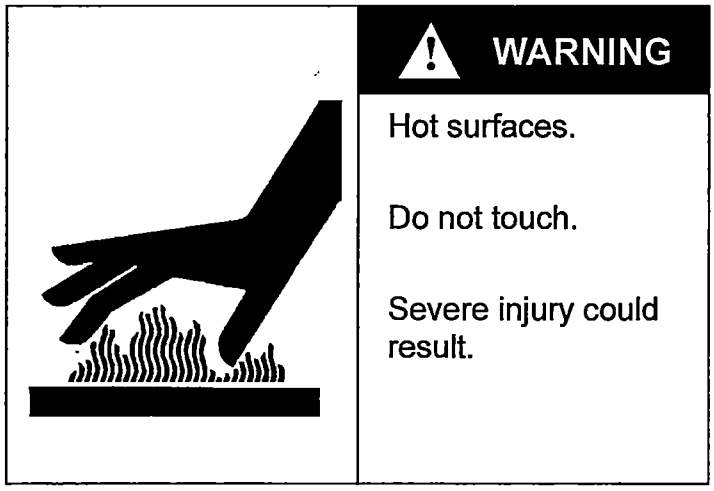
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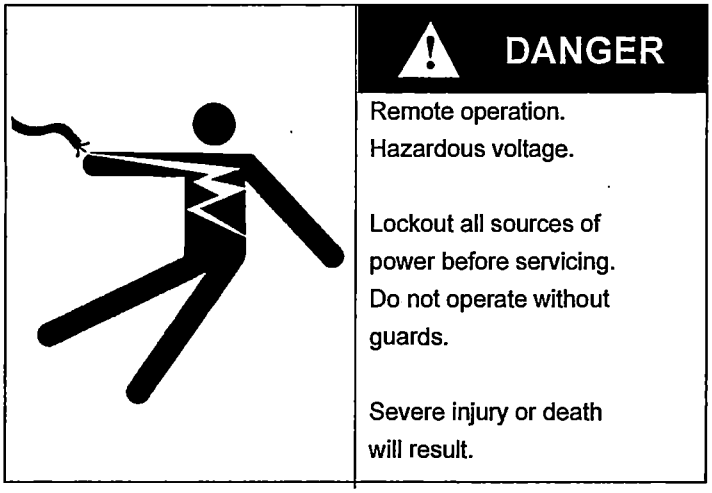
Toll Free 24 Hour Emergency Service: 800-448-5422

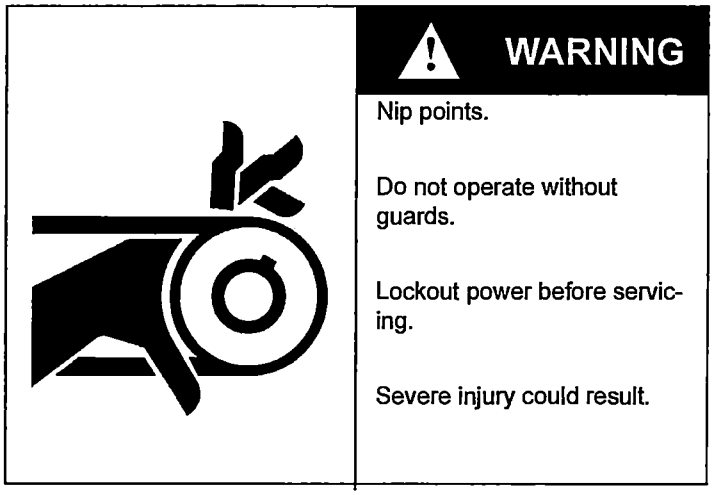
Laminated Safety Sign

1.4 SAFETY SIGNS

These following signs are factory installed and should remain on the unit for the life of the machine and should be kept clean and legible. Do not remove the signs unless replacement signs are in hand and installed immediately after the old signs are removed.









WARNING

Pressurized chamber.

One valve must be open during operation.

Depressurize & lockout all sources of power before servicing.

Severe injury or machine damage could result.



WARNING

Automatic valve gate.

Keep clear.

Lockout power before servicing.

Severe injury could result.

2.0 EQUIPMENT IDENTIFICATION

2.1 NAMEPLATE

Product identification numbers help identify this unit if it needs service.

Kadant Black Clawson needs these numbers when you order parts.

KADANT
BLACK CLAWSON

HYDRAPURGE III

SERIAL NO.

SIZE

JOB NO.

75

MAX. PRESSURE

WEIGHT

READ INSTRUCTION MANUAL BEFORE OPERATING

3.0 GENERAL INFORMATION

3.1 EQUIPMENT DETAIL

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, and servicing the unit to obtain optimum performance.

The information in this manual should cover most situations. Should questions arise that are not covered in this manual, contact us for additional information:

Customer Service

Kadant Black Clawson Inc.
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fax: 1-513-229-8197

Serial Numbers

The serial number is on the nameplate and the certified drawings. When inquiring about service or maintenance problems, always provide the serial number, size, and type of unit.

Renewal Parts

Orders for renewal parts should state the serial number(s) and include the item number, description, and part number shown on the parts list of the certified drawings. Part numbers are not specified in this manual. Refer to your certified drawings for part numbers.

3.2 DESCRIPTION

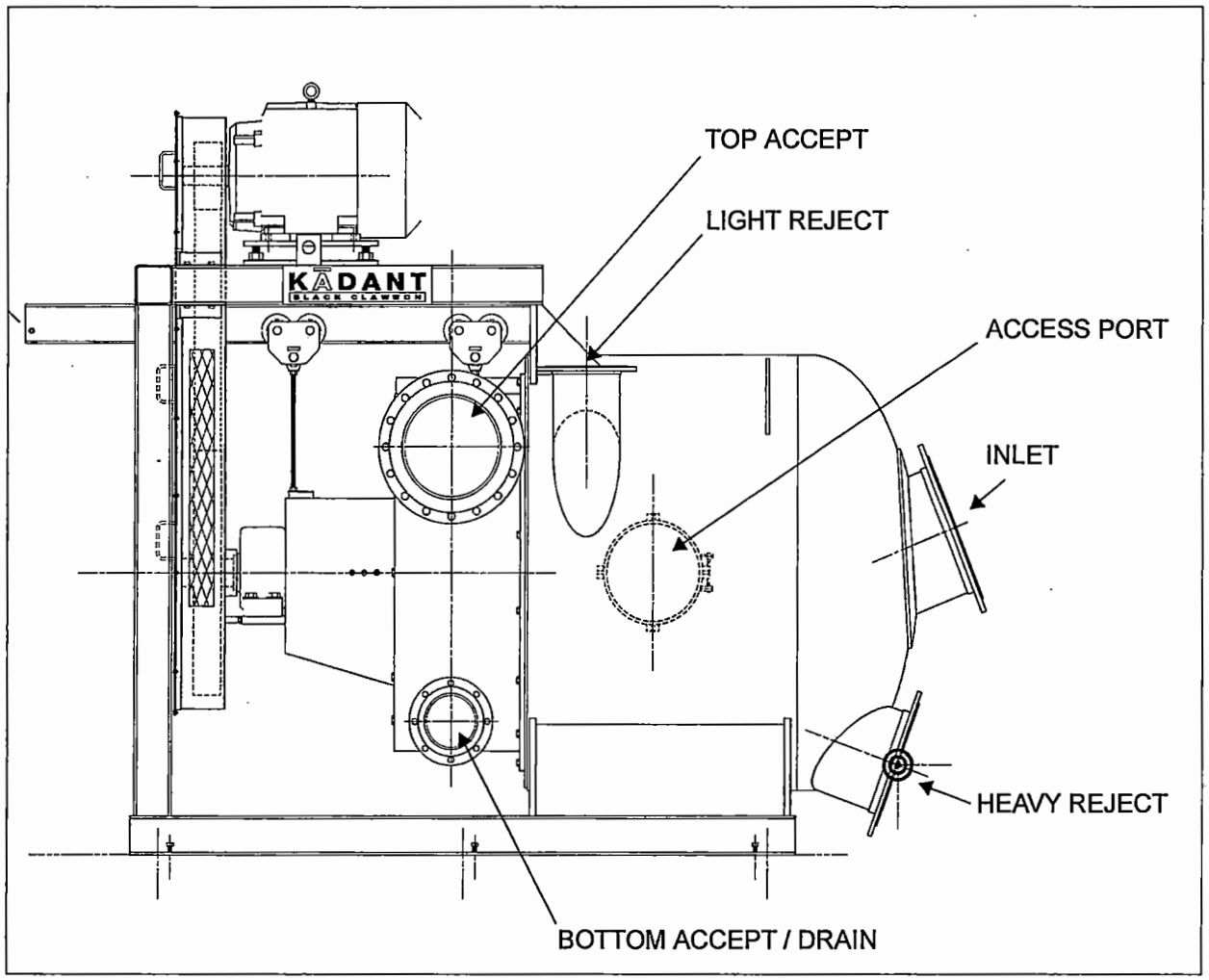
The Hydrapurge was first developed for use with a high consistency batch pulper to provide an effective means of separating out the coarse contaminants and eliminate the need for a pulper extraction plate.

The screening function is provided for by the large open area perforated screen plate equipped with replaceable debris deflector bars. The unique high-sweep low attrition rotor provides effective but gentle screen plate cleaning.

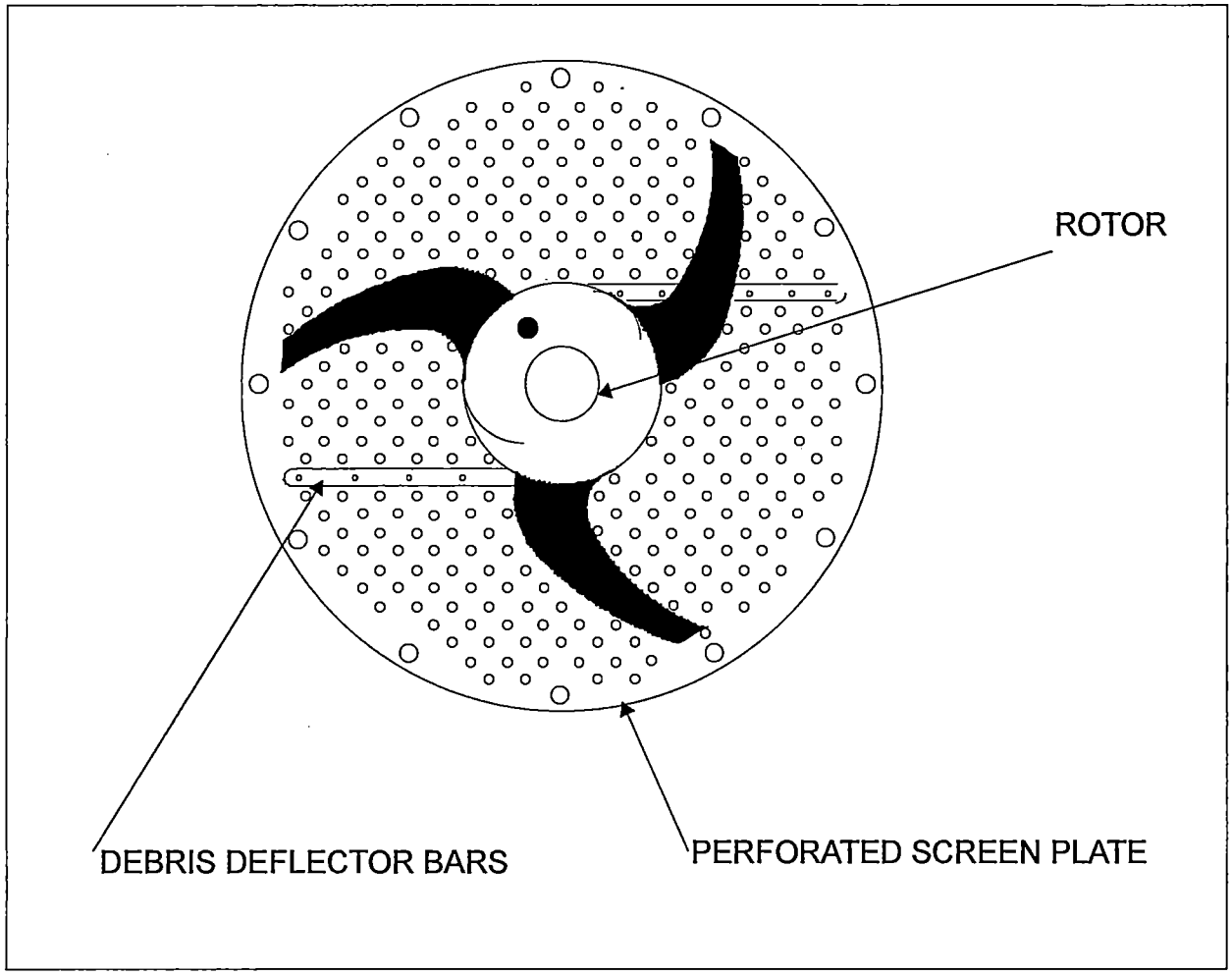
Two different configurations (A & B) allow two choices for handling the rejects:

- Configuration A: Vent to pulper and all rejects from bottom of Hydrapurge tub.
- Configuration B: Vent/Light rejects to a separate drum screen. Heavy rejects only discharged from bottom of Hydrapurge tub.

The accepts chamber or collector and drive assembly are mounted on a trolley arrangement allowing this entire section to be unbolted and rolled back for ease of maintenance.



Hydrapurge



Rotor Design

4.0 SHIPMENT CHECK

4.1 SHIPMENT/RECEIVING

Carrier

Kadant Black Clawson units and accessory equipment are shipped by truck.

Shipping Papers

One set of shipping papers is attached to the shipment in plain view to those unloading the unit. Another copy of the shipping papers was mailed to your receiving department.



WARNING

Verify weights shown on shipping papers with certified drawings and determine if your crane or hoist can lift the heaviest item safely.

Check-Off

During unloading, check-off parts from shipping papers. Report shortages to Kadant Black Clawson within 24 hours. File damage claim against transportation company within 24 hours.

Unloading Patterns

Trucks are generally unloaded from back to front. The crane operator must be sure of a clear lift or the piece being lifted may swing against other parts and cause damage.

Wooden Boxes (Crates)

Clamps, bolts, nuts, cap screws, eyebolts, and other small parts are shipped in one or more wooden boxes. Do not store these boxes outdoors.

Bracing Material

Leave wood blocks, steel strapping, and other bracing material in place until hoisting sling is in place and the piece is ready to be lifted.

4.2 UNLOADING/HANDLING

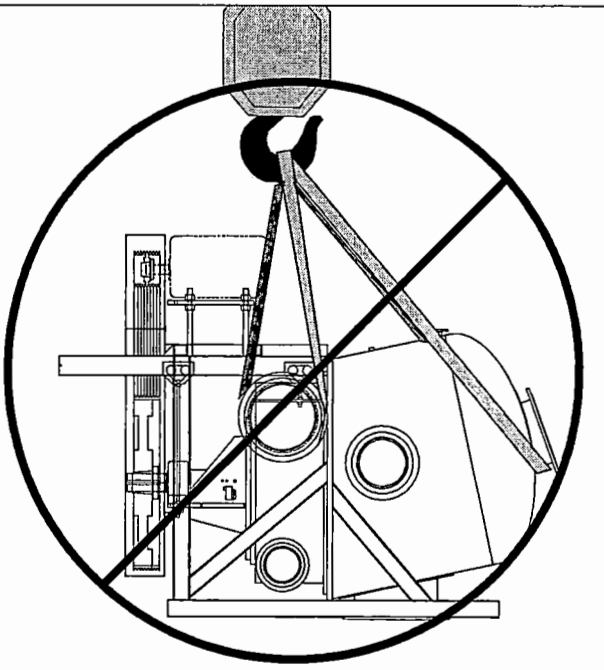
Lifting, Unloading, and Moving Unit

- Check to be sure that eyebolts and hooks are attached securely and have appropriate lifting rating.
- Straighten the sling as the slack is removed. Test by allowing the weight of the piece to be supported by the crane while the piece is not more than one or two inches (25-51 mm) above the truck bed.
- Lift pieces carefully and smoothly. With cast parts, the flanges will break next to the cored holes if pieces are jerked suddenly by the crane.
- Use properly sized rigging.
- All lifting and rigging must comply with federal, state, and local safety codes.

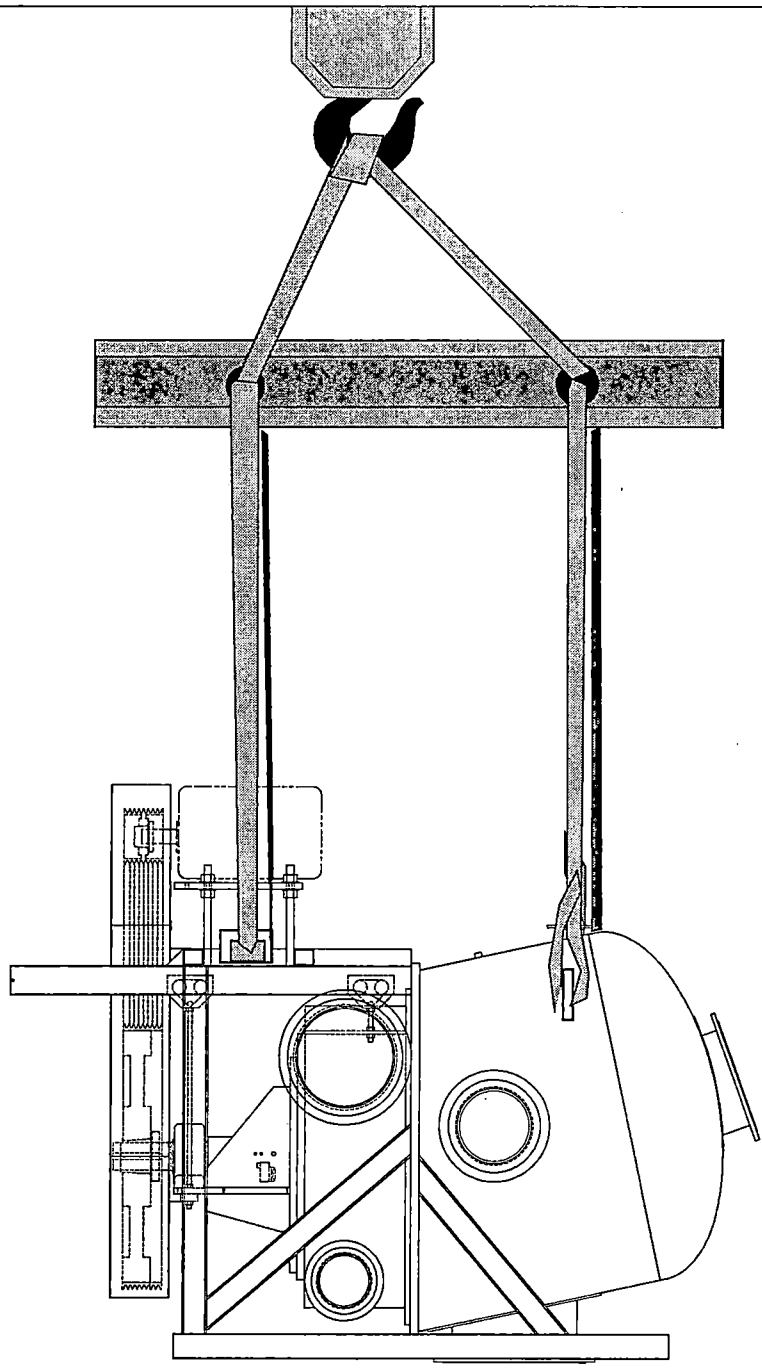
WARNING

Never stand underneath equipment that is being lifted. To do so is to risk severe personal injury or death.

- While unit is on the skid, it can be moved with a fork truck.
- Use shipping weight as a guide to determine lifting requirements. Verify that lifting equipment has sufficient capacity.
- Do not lift unit by chaining or slinging around pipe connections or motor stand.
- Pad any contact points between the tank and the chains or slings.



Improper Lifting



USE SPREADER BAR TO AVOID DAMAGING THE MACHINE

Recommended Lifting Method

5.0 STORAGE

5.1 UNIT STORAGE

Take the following precautions to minimize potential damage to the unit if outside storage is planned:

- Cover equipment with waterproof covering.
- Do not allow water to accumulate in or on the unit, especially if the weather conditions approach freezing (32 degrees Fahrenheit [0 degrees Centigrade]) or below.
- Do not store items such as valves, cylinders, switches, etc. outside.
- Consult the drive unit manual for any special storage requirements for the drive.

NOTE:

At the time of installation, all protective coatings must be removed carefully to prevent damage to the seals, etc. Bearings must be flushed and lubricated with lubricants that are clean and meet the specifications for the bearing application.

KADANT BLACK CLAWSON ASSUMES NO LIABILITY AS TO THE SPECIFIC STORAGE REQUIREMENTS FOR EQUIPMENT OR COMPONENTS.

6.0 INSTALLATION

6.1 SAFETY PRECAUTIONS

OPERATORS AND MAINTENANCE PERSONNEL! Read and make sure that you understand all of the safety information and correct procedures before using or servicing this equipment. This manual should be available to you at all times.

Do not modify the machine without authorization. Modifications could affect the function of the machine, shorten machine life, or render built-in safety features useless.

Never start the machine unless the following conditions are met: All personnel are clear of machine; Doors and hatches are closed; Guards and covers are in place.

See "Operation" section for complete start up procedure.

Do not exceed the maximum design pressure. Maximum design pressure of this unit is stated on the certified drawings.

Bring machine to ZMS before servicing. Unit must be at zero mechanical state (ZMS) before any service work is done. All energy sources and stock supply must be shut-off and locked out with your padlock before and during installation, maintenance, inspection, cleaning, or adjusting.



WARNING

Never remove another person's lockout (padlock) or tag.

Check disconnect. Try to start motor before servicing unit.

Bleed off pressure and lockout all pneumatic, hydraulic and steam systems, electrical circuits, chemical and gas systems, water, and stock flow.

Do not proceed if services are not independent of the main supply. Contact your supervisor.

Follow installation and maintenance procedures in this manual along with your company's safety guidelines.

Use valves designed for lockout and tagging. All valves used on this equipment should be designed to be locked out and tagged. Never operate unit without guards in place.

Tighten sheave bushings to manufacturer's specification.

Check torque prior to start up. Tack welding of bolt heads is an accepted industry practice.



CAUTION

Overtightening fasteners can result in failure of bolts and other attachments.

6.2 PRE-INSTALLATION

Complete pre-installation before you receive the unit. Use this section as a checklist.

Documents

- **Certified Drawings** - prepared by Kadant Black Clawson upon receipt of your purchase order and your returned approval drawings.
- **Owner's Manual** - sent with certified drawings.
- **Shipping List** - we send one copy with the shipment and one to the mill the day of shipment.

Foundation

Refer to the certified drawings for foundation information.

Equipment Placement

Certified drawings show space requirements for equipment operation and the anchor bolt plan. Consider equipment clearances in your layouts and maintenance and installation requirements.

When equipment has to be lowered through an opening in the floor above, be sure that it is in correct foundation position before the unit is erected.

NOTE: Check the certified drawings to determine if any unusual clearance problems will arise while moving the unit through the mill.

Lifting Equipment

We have attempted to ensure that the unit weights (not including crating weight) are on the certified drawings for each piece of equipment. If the weight is not on the certified drawings, contact Kadant Black Clawson. Verify that the hoist or crane at the mill has adequate load capacity to lift the unit safely. If not, lease lifting equipment or contract for the services of a rigger.

Electrical Requirements

Be sure that power cables and controls are properly sized, and can be routed to the unit with a minimum of bends and turns. Verify that the available electricity is correct for the equipment.

Electrical power is required for the Hydrapurge motor. Please refer to the installation drawings for the horsepower requirements.

Clean water of 1-3 GPM and 25 PSI supply pressure is required for lubricating the packing.

Compressed air at 80 PSI is recommended (70 PSI minimum) for the pulper dump and Hydrapurge reject valve cylinders. As is standard practice for pneumatic lines, a suitable filter/regulator/lubricator should be provided in the air lines to maintain valve cylinder life.

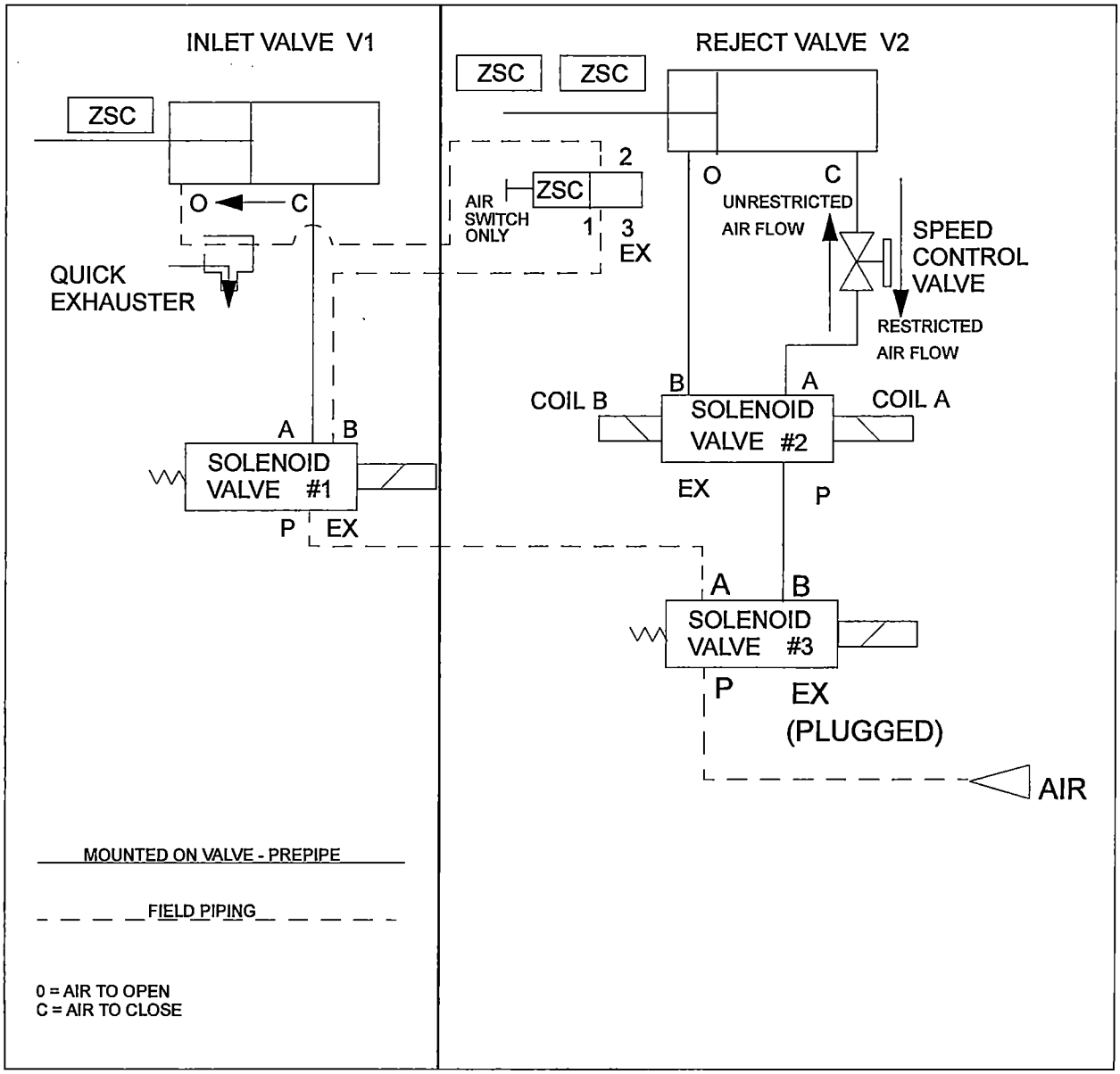
We recommend use of dilution/wash water at a ***maximum*** of 75 PSI supply.

Piping

Check certified drawings for pipe sizes. Be sure that correct sizes of pipe, fittings, and adapters will be available when the piping is installed. All piping must be well supported. Piping must not be connected to the unit until the grout has hardened and the foundation bolts have been tightened.

- Piping between the outlet of the main pulper and the inlet of the Hydrapurge should be as short as possible and with a downward slope to ensure that heavies do not settle out (we suggest a minimum 12 degree angle slope).

Pneumatic piping to the valves is to be made in accordance with good standard practice for such piping. A suitable filter-regulator/lubricator and a shut-off valve should be installed ahead of the valves.



Pneumatic Piping for Hydrapurge Valves V1 and V2

- The Hydrapurge vent should be piped back to the top of the pulper or the drum screen and open at all times.
- Vent piping should be constructed so that any plugs in this line can be removed quickly and easily.
- The installation drawing should be referenced for all required piping connections and sizes.

Leveling Instruments

The Starrett 12 inch Model 98 is the industrial standard for leveling heavy machinery. Level to within 0.005 of an inch (.13 mm) per foot (30 cm).

Utility Requirements

- Electrical power required for the rotor drive motor.
- A supply of white water at 65 PSI maximum is required for diluting and washing the stock.
- **Clear water at 10 PSI above wash water for lubricating the packing** in the packing box gland is also required. If control valves are supplied by Kadant Black Clawson, they will require an 70 PSI air supply for operation. A suitable filter regulator/lubrication and shut-off valve should be installed ahead of the valve operators.

Containment of Rejects Flow

The rejects flow must be controlled and contained to avoid flooding, splashing, and discharge into areas where people may be affected by the discharge. Installation personnel sometimes underestimate the possible quantity of the rejects discharge flow. It is extremely important to know how much discharge flow can occur and have methods to contain the flow.



WARNING

If you don't control and contain the reject flow, injuries such as cuts, abrasions, skin irritations, and scalding from splashing debris could occur to anyone standing in the area where an uncontained excessive rejects flow occurs.

6.3 INSTALLATION

Kadant Black Clawson assumes no responsibility for the site preparation and/or construction required for the installation of this equipment. An adequate foundation, determined from the machine weight and floor loading conditions, must be provided.

The general guidelines suggested in this manual are for those individuals involved in installing the unit. It is the responsibility of the customer's erection crew or agents to maintain As Built specifications during the installation of the unit. If you have any problems or questions concerning the installation of this equipment, please contact the Kadant Black Clawson Field Service Department.

Customer Supply

The customer is to furnish all foundations, anchor bolts, steel shims, packing, piping, valves, etc. Additionally, valves should have guards. Refer to quotations and certified drawings for a complete listing of parts and hardware furnished by Kadant Black Clawson.

Foundation Surfaces

Clean all loose concrete chips and dust from foundation.

Anchor Bolt Pockets

Remove all debris and dust from anchor bolt pockets before installing sleeves.

Shim Packs

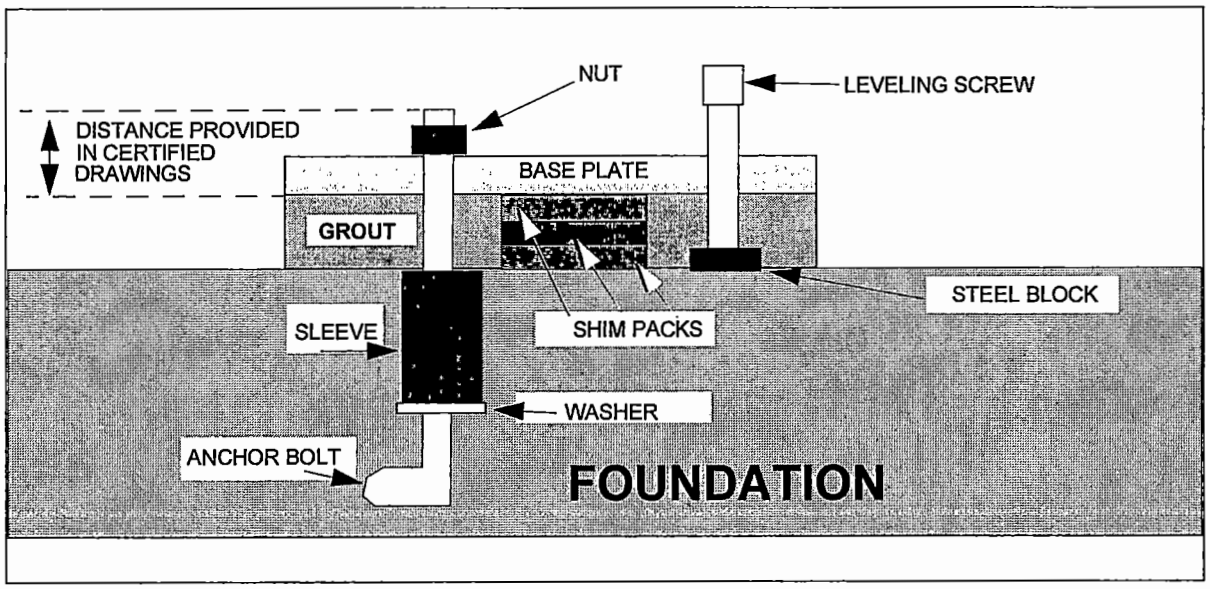
Steel shims will be required to level the unit before it is grouted in place. Mill supply must include 3 inch x 3 inch (76 mm x 76 mm) shims.

Anchor Bolts

Bolts must project at least ¼ inch (6.35 mm) through the nut when the unit is bolted down. Allow for grout and thickness of soleplate/footpads and nut when determining bolt length. See "Recommended Anchor Bolt Method" on page 28. The certified drawings call out the anchor bolt sizes, typical spacing, and layout. We recommend that anchor bolts be encased in sleeves to make allowance for minor deviations in mounting hole location.

Grout

All grout design and placement of grout is the responsibility of the customer. Deviations from standard grouting practice could result in structural failure. Piping must not be connected to the unit until the grout has thoroughly hardened and the foundation bolts have been tightened. All couplings should be final aligned after the piping is completed.



Recommended Anchor Bolt Method

Leveling

Install the unit on the foundation by lowering it over the anchor bolts. Level the unit and place steel shims next to each anchor bolt and underneath unsupported lengths of the unit base. Use care not to distort the alignment of the unit when shimming. The leveling screws are intended only for leveling and should carry no weight of the unit when the anchor bolts are tight. It is a good practice to remove the leveling screws at the completion of the installation.

Snug the nuts on the anchor bolts to hold the unit while the grout is poured and sets. Firmly tighten the nuts on the anchor bolts after the grout has set.

Check the base pads to assure that they are all resting on the shim blocks before the anchor bolts are tightened. Use caution to not have a soft foot which would pull a base pad down as the anchor bolt is tightened.

6.4 EQUIPMENT SET-UP

Mounting

The Hydrapurge is usually mounted on a customer supplied concrete base. The mounting dimensions, dynamic load, and space requirements for the Hydrapurge are all contained in the installation drawing. The Hydrapurge must be installed so that free space is available at the drive end of the Hydrapurge for removal of the rotor assembly and sufficient space under the reject nozzle for reject discharge into an auxiliary device such as a compactor, drainage conveyor, or similar device for capture and draining of Hydrapurge rejects.

CAUTION

Do not overpressure the Hydrapurge. Maximum design pressure of the Hydrapurge is 75 PSI.

Note: Overpressurizing the Hydrapurge may void your warranty.

The minimum clearance recommended for underneath the Hydrapurge is 48 inches as measured from the floor to the bottom side of the reject valve. This typically provides sufficient space for any of the methods for reject handling-hopper, belt conveyor, bucket conveyor or compactor, (ram press).

WARNING

Auxiliary equipment is required to complete the installation for the Hydrapurge. This equipment may include valves, conveyors, and other items. This auxiliary equipment may or may not be supplied by Kadant Black Clawson. Installers and users must be aware that safety in the installation of these auxiliary components is extremely important. Therefore, it is the user's responsibility to make certain that such auxiliary equipment, whether supplied by Kadant Black Clawson or others, is properly guarded to assure the safety of workers. This is particularly important with regard to conveyors. Often, conveyors are placed in limited space and, when the bucket is in the raised position or in an alternate position, the hazard may not be apparent. In these cases, users are advised to make certain that adequate guarding is provided to prevent accidental injury.

Typical Auxiliary Applications

Contact Kadant Black Clawson for bucket conveyor system.

Process Interlocks

A process device involving V1 (pulper dump valve) and V2 (Hydrapurge reject valve), consists of

a three-way solenoid valve feeding supply pressure to these two valves. This is referred to as SOL 3. This valve is energized during the cycle to supply air to open or close V2 (Hydrapurge reject valve). In the de-energized condition, air can only be supplied to V1 (pulper dump valve). Since it can only supply one valve at a time, it prevents the simultaneous opening of both of these valves should a spurious voltage spike or module failure attempt to do this. The second process device involving V1 (pulper dump valve) and V2 (Hydrapurge reject valve) is a pneumatic limit switch. This is mounted on V2 (Hydrapurge reject valve) (when supplied by Kadant Black Clawson) and prevents V1 (pulper dump valve) from opening when V2 (Hydrapurge reject valve) is not closed.

Overpressurization

To help keep your equipment from overpressurizing, install a pressure transmitter and switch as shown in the illustrations that follow.

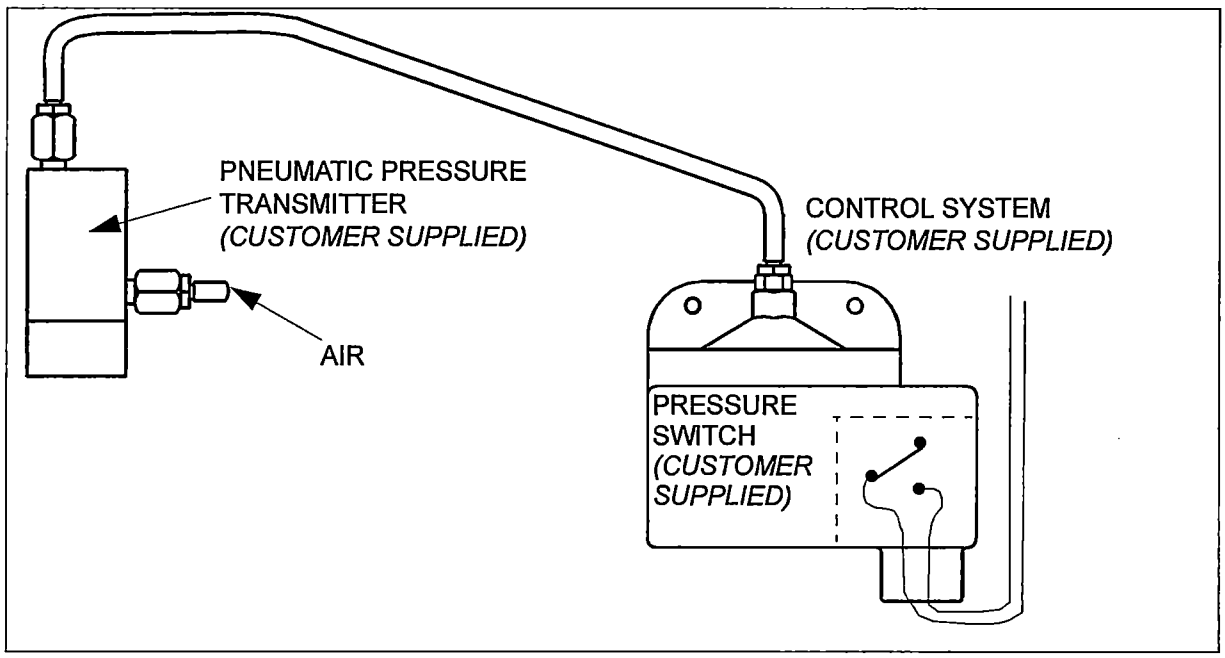
Install the pressure transmitter on the unit or between the feed valve and the unit.

Set the pressure switch to trip at 3 to 5 PSI below the maximum pressure of the unit. Connect the pressure switch to the control system to initiate the overpressurization shut down sequence upon tripping.

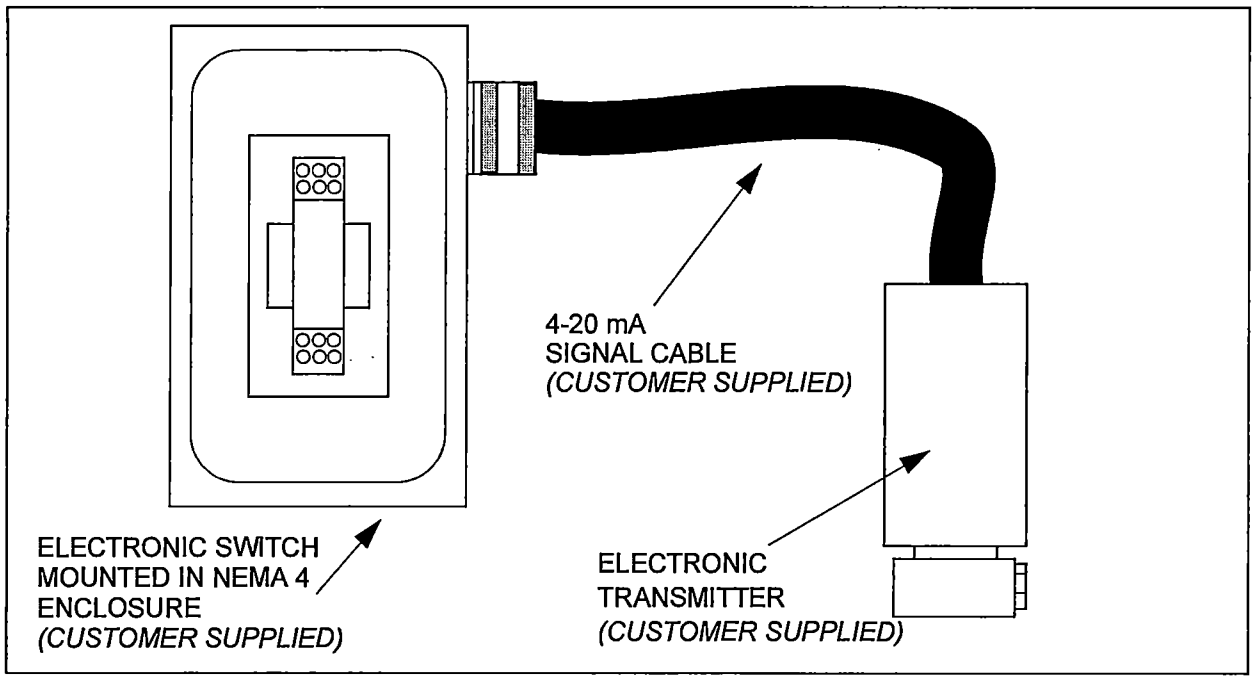
Before putting the unit into service, simulate an overpressurization condition to verify proper overpressurization shut down.

We recommend the following sequence for overpressurization shut down.

- Shut off drive motor.
- Close dilution valve.
- Open pulper feed valve.
- Close off water to packing.



Pneumatic Pressure Transmitter and Switch Recommendation



Electronic Pressure Transmitter and Switch Recommendation



WARNING

Failure to install a pressure transmitter and switch or set the switch to trip as described in this section could result in personal injury or machine damage.

Containment of Rejects Flow

The rejects flow must be controlled and contained to avoid flooding, splashing, and discharge into areas where people may be affected by the discharge. Installation personnel sometimes underestimate the possible quantity of the rejects discharge flow. It is extremely important to know how much discharge flow can occur and have methods to contain the flow.



WARNING

If you don't control and contain the rejects flow, injuries such as cuts, abrasions, skin irritation, and scalding from splashing debris could occur to anyone standing in the area where an uncontained excessive rejects flow occurs.

7.0 OPERATION

7.1 PRE-CHECKOUT

Many programmable solid state systems have the capability of simulating operation in a mode known as Test Mode or Dry Run Mode. These modes allow a user to check a program and correct obvious programming errors with outputs disabled. Unexpected machine motion and possible damage to equipment is avoided. These modes can also be used to verify proper system operation after a repair.

Many programmable systems provide for Force On and Force Off of inputs and outputs. These functions can reduce troubleshooting and maintenance time by enabling personnel to bypass certain operations without physically operating switches on a machine.

WARNING

Use care when using *Force* functions to avoid exposing personnel to hazardous machine motions or process operations which might cause severe personal injury or death.

Mechanical start up involves the following steps, which must be carried out in sequence:

- Inspect the installation before the power is connected.
- Disconnect motors and other devices that cause machine motion.
- Test inputs.
- Test outputs.
- Enter and verify your program.
- Test the system with motors and other motion-causing devices reconnected.
- Go through a dry run of the application.

The purpose of these procedures is to isolate such problems as wiring mistakes, equipment malfunction, and programming errors in a systematic, controlled manner. Go through these procedures very carefully. The following steps will help avoid possible personal injury and equipment damage.

WARNING

During all phases of motion check-out, station a person ready to operate the power switch if necessary.

Inspect and make sure of the following before starting the unit:

- 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.

The Hydrapurge requires little or no operator action during operation other than start up, monitoring, and shut down. During the run and following large variations in system stock feed, it may be necessary to readjust the timers.

A FIRST-TIME CHECKOUT SHOULD INCLUDE THE FOLLOWING:

Before starting the Hydrapurge for the first time, make the following checks to make sure that the installation is complete and that the unit is ready for operation.

- Check that the bearings are properly lubricated.
- Check belt tension. Specific instructions on checking and adjusting belt tension are included in the preventive maintenance section.
- Check Hydrapurge packing gland tightness. Turn on the packing water and make sure that a continuous drip of water leaks from the packing gland. After the Hydrapurge has run for several hours, recheck and adjust the packing gland.
- Check the rotor clearance. This can be done through the inspection port provided on the side of the Hydrapurge body. Check the rotor clearance between the rotor and cutter bars, or rotor and screen plate as applicable. Refer to your rotating assembly drawing.
- Turn Hydrapurge motor by hand to ensure that there is no binding, scraping, bobble or unusual noise.
- Check the Hydrapurge drive motor rotation. Rotor rotates clockwise when looking from the drive end.
- Water ports on the reject valve should be connected to clean water source and turned on. Stroke all the valves to verify proper operation.

Hydrapurge Valves:

  - Pulper dump valve, V1
  - Hydrapurge reject valve, V2
  - Hydrapurge fill/dilution/wash valve, V3
  - Hydrapurge dump pump control valve, V4
  - Hydrapurge drain valve, V7

- Check all the valve limit switches to verify that they provide proper indication of open or closed position on each respective valve. Verify proper operation of the pneumatic switch provided on V2. When this switch is installed properly, air intended for V1 will exhaust through this switch if V2 is not closed. This prevents V1 from operating if V2 is not closed.
- As a final check out, run the Hydrapurge sequence through dry. This will provide a final verification of the operation of all valves and sequence programming.

7.2 CONTROL GUIDELINES

Safety considerations are an important element of proper troubleshooting procedures. Actively thinking about safety of yourself and others, as well as the condition of your equipment is of primary importance.

Power Supply

Before working on a power supply, always remove the AC power source at the main disconnect switch. When using more than one power supply, be sure to disconnect all of them.

Main Power Disconnect

The main power disconnect switch should be located where operators and maintenance personnel have quick and easy access to it. Ideally, the disconnect switch is mounted on the outside of the enclosure so that it can be accessed without opening the enclosure. In addition to disconnecting electrical power, de-energize all other sources of power (pneumatic and hydraulic) before working on a panel controlled machine or process.

Activating Devices When Troubleshooting

When troubleshooting, never reach into the machine to actuate a device. Unexpected machine motion could occur.

Operation Safety Precaution

When troubleshooting any control panel problem, have all personnel remain clear of the machine. The problem could be intermittent, and sudden unexpected motion could occur. Have someone ready to operate an emergency stop switch in case it becomes necessary to shut off power to the machine.

Program Alteration

There are several causes of alteration to the user program, including extreme environmental conditions, electromagnetic interference (EMI), improper grounding, improper wiring connections and unauthorized tampering. If you suspect the memory has been altered, check the program against an approved version such as on the EEPROM memory module.

Hardwired Circuitry



WARNING

Circuits that are installed on the machine for safety reasons, including overtravel limit switches, stop push buttons, and interlocks, should always be hardwired in series so that when any one device opens, the master control relay is de-energized, thereby removing power to the machine. Never alter these circuits to defeat their function. Serious injury or machine damage could occur.

Safety Recommendation for Maintenance Personnel

All maintenance work should be done by qualified personnel familiar with construction, operation, and hazards involved with the equipment. Always bring equipment to zero mechanical state before doing maintenance procedures.

Follow the appropriate work practices of the National Fire Protection Association (NFPA) for Electrical Standards for Industrial Machinery.

Make-Do testing devices such as incandescent lamps have low impedance. The low impedance of these devices can effectively change a voltage level from logic **1** condition to a logic **0** condition when attempting to make a measurement. Unexpected machine motion can result if an output to a controlled device is energized as a result. Neon lamps do not respond to voltages typically used in logic circuits (e.g. 32 VDC or less). Use of a neon lamp tester could lead to false conclusions about the voltage present in a circuit.

High input impedance meters are required to obtain accurate voltage measurements in high impedance circuits. Unless otherwise specified by the manufacturer, a meter with an input impedance of ten (10) megohms or greater is recommended for making voltage measurements. The meter must also have sufficient sensitivity to measure logic level voltages; some meters do not respond to low voltages.

Control Panels

The control panels are designed using all NEMA (National Electrical Manufacturer's) and/or UL (Underwriter's Laboratory) approved components suited for the environment in which it is being placed. Every effort is made to adhere to the NEC (National Electrical Code), OSHA (Occupational Safety and Health Act), ANSI (American National Standards Institute), and mill standards as they apply to your application.

The power feed should include an equipment grounding conductor to bond the enclosure to building earth ground.



DANGER

Touching exposed live electrical wires will cause serious personal injury or death.

- Power feed should have a disconnect or breaker capable of being locked in the open position.
- Wire field devices per certified drawings furnished with the control panel.
- Route field wiring to separate the AC from the DC and/or low level signals.
- All the electronic instruments were factory programmed to a fail safe state if a component failure occurs. The panels include a power push button that will power down the main processor, closing all valves.

Education and Knowledge Lead to Safety

Planning for an effective solid state circuit requires enough knowledge to make basic decisions that will render the system safe as well as effective. Everyone who works with a solid state control should be educated in its capabilities and limitations. This includes in-plant installers, operators, service personnel, and system designers.

7.3 OPERATION

Typical Hydrapurge Operation – Configuration A

The Hydrapurge is close coupled to the lower part of the pulper vat. When the pulping cycle is completed, the Hydrapurge cycle is initiated.

Make sure that the following conditions are met before turning on the Hydrapurge.

A. Gear box lube pump is running

B. Pulper drive motor is running (#1 is a permissive for #2)

C. Conveyor loaded to proper weight for one batch.

D. Head tank level above the minimum level setpoint. If a maximum pulping time is required, the dump chest level must be below a certain point before the next step can be initiated.

E. Start the AUTO batch sequence (B, C, and D are all permissives for E to start).

Starting Procedure

1. Open pulper fill valve (V5). (V1 must show closed as a permissive.) Add 20 to 25% of water required for batch. (Integrator should close fill valve when the requirement is met.)
2. Start conveyor.
3. When 60 to 80% of the furnish has entered the pulper, start adding the remainder of the required water at a rate at which the water will still be flowing for approximately one minute after all the furnish has been added.
4. When all the water has been added, the integrator should close the pulper fill valve (V5).
5. Start the pulping timer.

When the pulping timer times out AND the dump chest level is low enough to accept a batch, the pulper dump sequence is initiated.

Hydrapurge Fill Step

6. Close the Hydrapurge reject valve (V2). When V2 satisfies the closed limit switch, proceed.
7. Open the Hydrapurge fill/dilution/wash valve (V3) to control the flow at the desired set point.

Pulper Dump Step (Configuration A)

8. Start Hydrapurge drive motor (M2). After confirming that the drive motor is running, open the pulper dump valve (V1). Wait until V1 is at least 50% open.
9. Open pulper fill valve (V5) to the pre-determined setting. Start the dump pump motor (M3). Open Hydrapurge dump pump control valve (V4) to the pre-determined setting which will allow the proper flow rate. Start the pulper dump timer or base dump time on the pulper level transmitter if is has proven to be reliable.

NOTE: We recommend that an anti-plugging program be incorporated into the pulper dump sequence. If, after one minute of pulper dump time, the Hydrapurge motor load reaches the pre-set high limit (i.e., 85% FLA.) or the pulper dump pump flow rate drops below dilution water flow rate, an excessive trash concentration in the Hydrapurge is probably blinding the Hydrapurge

screen plate.

To avoid plugging the screen plate or tripping out the Hydrapurge drive motor, the program should interrupt the dump timer and go directly to step 12, continue through step 17, return to step 6, and continue the pulper dump sequence.

The wash time incorporated into this anti-plugging program has to be much longer than the normal wash time because of the high fiber content in the Hydrapurge. A total wash water volume equal to four times the Hydrapurge volume (4 x 1,600 = 6,400 gallons) should be sufficient to reduce the fiber content to a reasonable level.

Pulper Wash

10. At the end of the dump time, start the pulper wash timer (15 to 20 seconds).

Discharge Wash

11. Close valve V5. Delay for 15 to 20 seconds.

Isolate Pulper

12. Close valve V1.

Hydrapurge Wash

13. The normal wash time required should be very brief because the consistency in the Hydrapurge should be low at this point in the sequence. We suggest 20 to 30 seconds of wash time as a starting point and adjust the time based on the observed fiber content of the Hydrapurge rejects.

Hydrapurge Drain

14. Close the Hydrapurge fill/dilution/wash valve (V3). Note that the next pulper batch could be started at this point in the sequence. Open Hydrapurge drain valve (V6).

15. Start draining. When the flow registered by the flowmeter in the pump discharge line drop to 50 to 100 GPM, close the Hydrapurge drain valve (V6). Delay for a few seconds to be sure that V6 is closed.

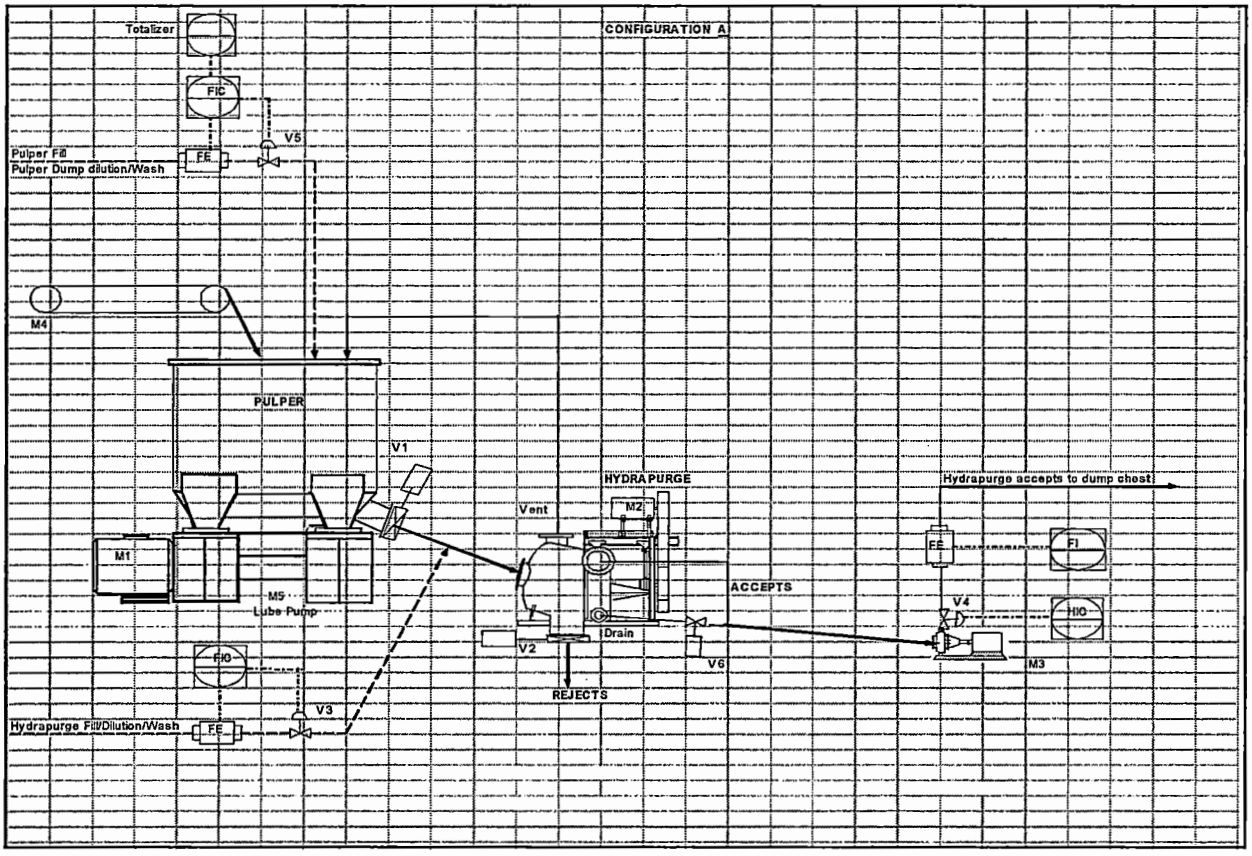
Hydrapurge Dump

16. Stop pulper dump pump motor (M3).

17. Open the Hydrapurge reject valve (V2).

Safety Precautions

The Hydrapurge is provided with several recommended safety precautions. The control should be set up such that the pulper dump valve (V1) will not open unless the Hydrapurge reject valve (V2) closed limit switch is made. Also, the controls should be designed so that the Hydrapurge reject valve (V2) will not open unless the pulper dump valve (V1) closed limit switch is made. Kadant Black Clawson installs an additional solenoid on V1 which controls air flow to either V1 or V2. With this solenoid installed, air can never energize V1 and V2 at the same time. Finally, Kadant Black Clawson recommends the installation of the pneumatic limit switch provided, as shown in diagram at the end of this manual. This pneumatic limit switch will not allow air to go to the pulper dump valve (V1) if the Hydrapurge reject valve (V2) is not closed.



Configuration A: Diagram

Configuration A: Sequencing

STEP / FUNCTION	V1 NC	V2 NO	V3 NC	V4 NC	V5 NC	V6 NC	M1	M2	M3	M4	M5
0. Standby	C	O	C	C	C	C	+	i	i	i	+
1. Fill Pulper (a) pre-fill	C	O	C	C	CTRL	C	+	i	i	i	+
2. Fill Pulper (b) start conveyor	C	O	C	C	C	C	+	i	i	+	+
3. Fill Pulper (c) add water, conveyor running	C	O	C	C	CTRL	C	+	i	i	+	+
4. Fill Pulper (d) add water, conveyor empty	C	O	C	C	CTRL	C	+	i	i	i	+
5. Pulping	C	O	C	C	C	C	+	i	i	i	+
6. Fill Hydrapurge (a) close V2	C	C	C	C	C	C	+	i	i	i	+
7. Fill Hydrapurge (b) add water	C	C	CTRL	C	C	C	+	i	i	i	+
8. Pulp Dump (a) open V1	O	C	CTRL	C	C	C	+	i	i	i	+
9. Pulp Dump (b) dump	O	C	CTRL	HIC	CTRL	C	+	+	+	i	+
10. Pulp Dump (c) pulper wash	O	C	CTRL	HIC	CTRL	C	+	+	+	i	+
11. Pulp Dump (d) discharge wash	O	C	CTRL	HIC	C	C	+	+	+	i	+
12. Isolate Pulper	C	C	CTRL	HIC	C	C	+	+	+	i	+
13. Hydrapurge Wash	C	C	CTRL	HIC	C	C	+	+	+	i	+
14. Hydrapurge Drain (a) open V6	C	C	C	HIC	C	O	+	+	+	i	+
15. Hydrapurge Drain (b) close V6	C	C	C	C	C	C	+	+	+	i	+
16. Hydrapurge Dump	C	C	C	C	C	C	+	i	i	i	+
17. Hydrapurge Dump (V2 open)	C	O	C	C	C	C	+	i	i	i	+
18. Hydrapurge Standby	C	O	C	C	C	C	+	i	i	i	+
LEGEND O = valve open; C = valve closed; + = motor running; i = motor off; CTRL = valve flow controlled;											
HIC = valve at selected setting											

Typical Hydrapurge Operation – Configuration B

The Hydrapurge is close coupled to the lower part of the pulper vat. When the pulping cycle is completed, the Hydrapurge cycle is initiated.

Make sure that the following conditions are met before turning on the Hydrapurge.

A. Gear box lube pump is running

B. Pulper drive motor is running (#1 is a permissive for #2)

C. Conveyor loaded to proper weight for one batch.

D. Head tank level above the minimum level setpoint. If a maximum pulping time is required, the dump chest level must be below a certain point before the next step can be initiated.

E. Start the AUTO batch sequence (B, C, and D are all permissives for E to start).

Starting Procedure

1. Open pulper fill valve (V5). (V1 must show closed as a permissive.) Add 20 to 25% of water required for batch. (Integrator should close fill valve when the requirement is met.)

2. Start conveyor.

3. When 60 to 80% of the furnish has entered the pulper, start adding the remainder of the required water at a rate at which the water will still be flowing for approximately one minute after all the furnish has been added.

4. When all the water has been added, the integrator should close the pulper fill valve (V5).

5. Start the pulping timer.

When the pulping timer times out AND the dump chest level is low enough to accept a batch, the pulper dump sequence is initiated.

Hydrapurge Fill Step

6. Close the Hydrapurge reject valve (V2). When V2 satisfies the closed limit switch, proceed.

7. Open the Hydrapurge fill/dilution/wash valve (V3) to control the flow at the desired set point.

Pulper Dump Step (Configuration B)

8. Start Hydrapurge drive motor (M2). After confirming that the drive motor is running, open the pulper dump valve (V1). Wait until V1 is at least 50% open.

9. Open pulper fill valve (V5) to the pre-determined setting. Start the dump pump motor (M3). Open Hydrapurge dump pump control valve (V4) to the pre-determined setting which will allow the proper flow rate. Start the pulper dump timer or base dump time on the pulper level transmitter if is has proven to be reliable.

NOTE: We recommend that an anti-plugging program be incorporated into the pulper dump sequence. If, after one minute of pulper dump time, the Hydrapurge motor load reaches the pre-set high limit (i.e., 85% FLA.) or the pulper dump pump flow rate drops below dilution water flow rate, an excessive trash concentration in the Hydrapurge is probably blinding the Hydrapurge screen plate.

To avoid plugging the screen plate or tripping out the Hydrapurge drive motor, the program should interrupt the dump timer and go directly to step 12, continue through step 18, return to step

6, and continue the pulper dump sequence.

The wash time incorporated into this anti-plugging program has to be much longer than the normal wash time because of the high fiber content in the Hydrapurge. A total wash water volume equal to four times the Hydrapurge volume (4 x 1,600 = 6,400 gallons) should be sufficient to reduce the fiber content to a reasonable level.

Pulper Wash

10. At the end of the dump time, start the pulper wash timer (15 to 20 seconds).

Discharge Wash

11. Close valve V5. Delay for 15 to 20 seconds.

Isolate Pulper

12. Close valve V1.

Hydrapurge Wash

13. The normal wash time required should be very brief because the consistency in the Hydrapurge should be low at this point in the sequence. We suggest 20 to 30 seconds of wash time as a starting point and adjust the time based on the observed fiber content of the Hydrapurge rejects.

Purge Light Rejects

14. Start Drum Screen motor (M6) and open drum screen shower valve (V8). Close Hydrapurge accept valve (V7). Water valve (V3) remains open and forces light rejects to flow to the drum screen. It requires a water volume of at least 3-4 times the Hydrapurge vat volume to effectively purge the light rejects to the drum screen.

Hydrapurge Drain

15. Close the Hydrapurge fill/dilution/wash valve (V3). Note that the next pulper batch could be started at this point in the sequence. Open Hydrapurge accept valve V7. Open Hydrapurge drain valve (V6).

16. Start draining. When the flow registered by the flowmeter in the pump discharge line drop to 50 to 100 GPM, close the Hydrapurge drain valve (V6). Delay for a few seconds to be sure that V6 is closed.

Hydrapurge Dump-Heavies

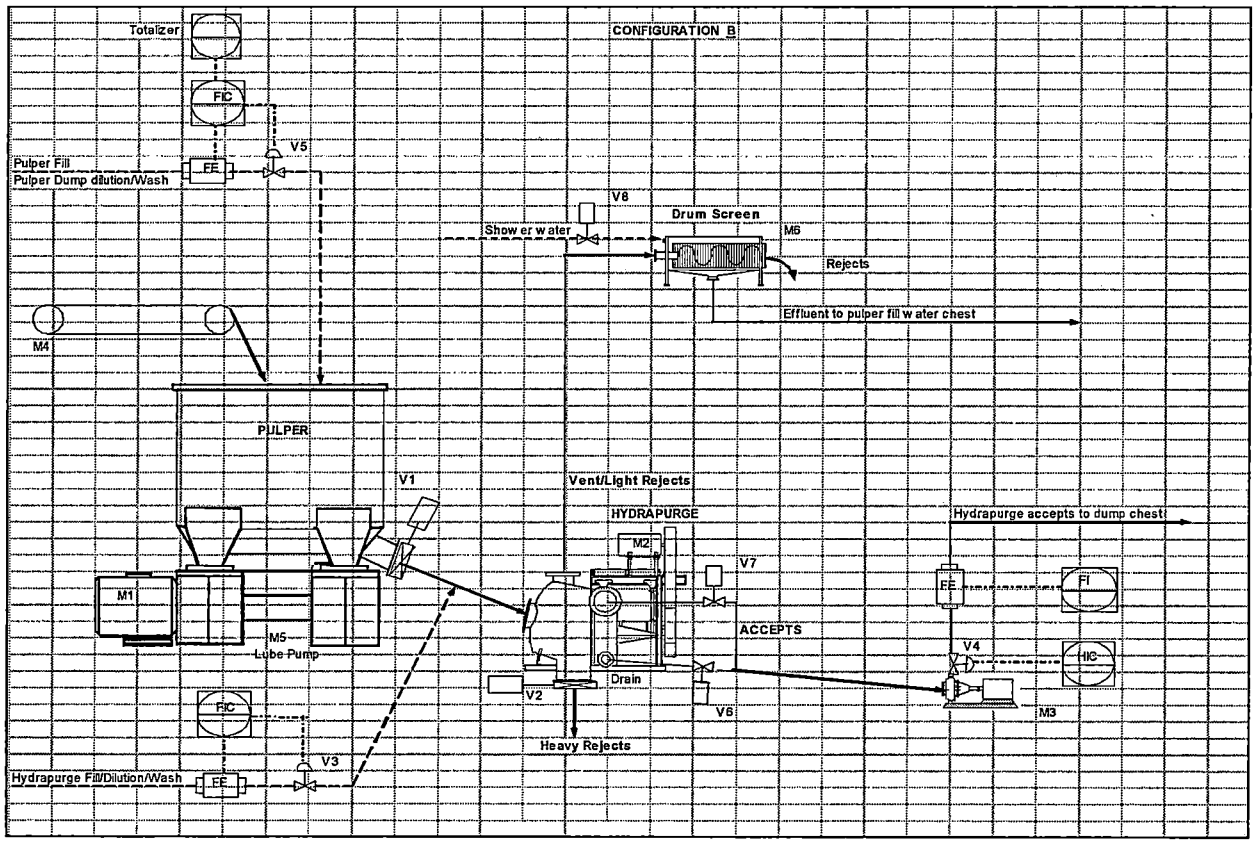
17. Stop pulper dump pump motor (M3).

18. Open the Hydrapurge reject valve (V2). Stop drum screen motor (M6) and close drum screen shower valve (V8)

Safety Precautions

The Hydrapurge is provided with several recommended safety precautions. The control should be set up such that the pulper dump valve (V1) will not open unless the Hydrapurge reject valve (V2) closed limit switch is made. Also, the controls should be designed so that the Hydrapurge reject valve (V2) will not open unless the pulper dump valve (V1) closed limit switch is made. Kadant

Black Clawson installs an additional solenoid on V1 which controls air flow to either V1 or V2. With this solenoid installed, air can never energize V1 and V2 at the same time. Finally, Kadant Black Clawson recommends the installation of the pneumatic limit switch provided, as shown in diagram at the end of this manual. This pneumatic limit switch will not allow air to go to the pulper dump valve (V1) if the Hydrapurge reject valve (V2) is not closed.



Configuration B: Diagram

Configuration B: Sequencing

STEP / FUNCTION	V1 NC	V2 NO	V3 NC	V4 NC	V5 NC	V6 NC	V7 NO	V8 NC	M1	M2	M3
0. Standby	C	O	C	C	C	C	O	C	+	i	i
1. Fill Pulper (a) pre-fill	C	O	C	C	CTRL	C	O	C	+	i	i
2. Fill Pulper (b) start conveyor	C	O	C	C	C	C	O	C	+	i	i
3. Fill Pulper (c) add water, conveyor running	C	O	C	C	CTRL	C	O	C	+	i	i
4. Fill Pulper (d) add water, conveyor empty	C	O	C	C	CTRL	C	O	C	+	i	i
5. Pulping	C	O	C	C	C	C	O	C	+	i	i
6. Fill Hydrapurge (a) close V2	C	C	C	C	C	C	O	C	+	i	i
7. Fill Hydrapurge (b) add water	C	C	CTRL	C	C	C	O	C	+	i	i
8. Pulp Dump (a) open V1	O	C	CTRL	C	C	C	O	C	+	i	i
9. Pulp Dump (b) dump	O	C	CTRL	HIC	CTRL	C	O	C	+	+	+
10. Pulp Dump (c) pulper wash	O	C	CTRL	HIC	CTRL	C	O	C	+	+	+
11. Pulp Dump (d) discharge wash	O	C	CTRL	HIC	C	C	O	C	+	+	+
12. Isolate Pulper	C	C	CTRL	HIC	C	C	O	O	+	+	+
13. Scavenger Wash	C	C	CTRL	HIC	C	C	O	O	+	+	+
14. Purge Light Rejects	C	C	CTRL	C	C	C	C	O	+	+	i
15. Hydrapurge Drain (a) open V6	C	C	C	HIC	C	O	O	O	+	+	+
16. Hydrapurge Drain (b) close V6	C	C	C	C	C	C	O	O	+	+	+
17. Hydrapurge Dump	C	C	C	C	C	C	O	O	+	i	i
18. Hydrapurge Dump (V2 open)	C	O	C	C	C	C	O	C	+	i	i
19. Hydrapurge Standby	C	O	C	C	C	C	O	C	+	i	i

LEGEND O = valve open; C = valve closed; + = motor running; i = motor off; CTRL = valve flow controlle

Normal Shut Down

- When the Hydrapurge is in "stand-by," shut down.

Emergency Shut Down

Hit the Emergency Stop button and the following steps should occur.

- Hydrapurge drive motor shuts off (M2)
- Shut off the dump pump motor (M3)
- Hydrapurge fill/dilution/wash valve closes (V3)
- Pulper dump valve closes (V1)



WARNING

Before entering pulper to clean stock valve, ensure that power to pulper and to Hydrapurge has been shut off and circuit breakers are locked and tagged to guard against accidental pulper or Hydrapurge start up. Also make sure that air supply to Hydrapurge is shut off, locked out, and tagged. Bring the pulper and Hydrapurge to ZMS.



WARNING

Don't ever inspect the stock valve by looking through the reject valve. Sudden unplugging could result very serious injury to you.



WARNING

Before attempting to clean reject valve, ensure that V1 (pulper dump valve) is closed and air supply to *open* side of air cylinder is disconnected.

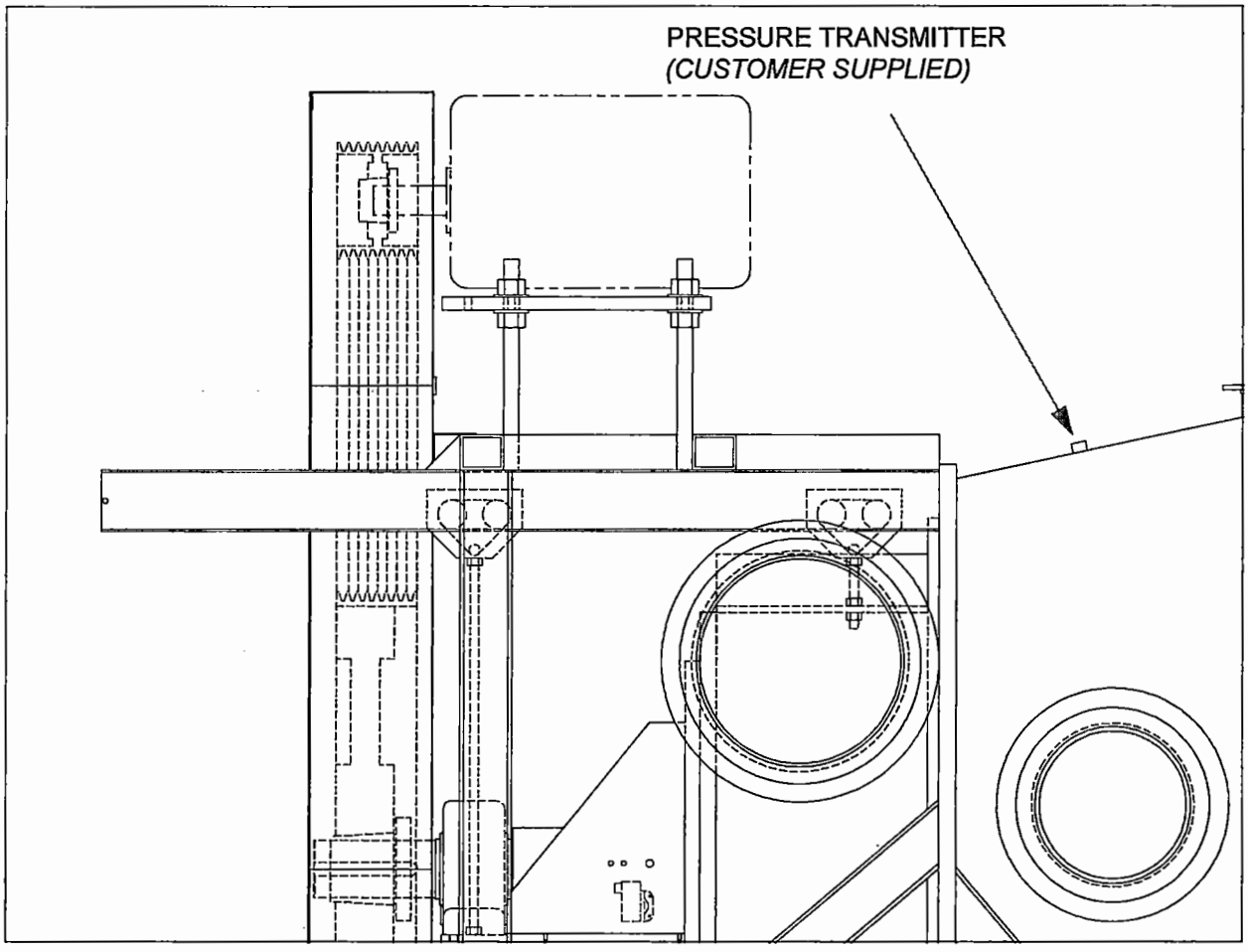
7.4 OVERPRESSURIZATION

Along with various interlocks built into the sequential program, the Hydrapurge is also protected against overpressure and simultaneous opening of the V1 (pulper dump valve) and the V2 (Hydrapurge reject valve).

As the unit approaches its maximum design pressure, the pressure switch (customer supplied) will trip and send a signal to initiate the overpressurization shut down.

CAUTION

Before restarting the system, determine the cause of overpressurization.



Pressure Transmitter - Suggested Location

8.0 MAINTENANCE

8.1 ROUTINE MAINTENANCE

Perform a general inspection of the equipment at least every three months or every 1,000 hours of running time. Locating and eliminating minor problems will extend the service life of the unit.

Periodic Inspection

Perform a general inspection and tightening of the machine twice a year. Locating and eliminating minor problems will assure long and dependable service. In many instances, periodic inspections will eliminate costly shut downs and delays.



WARNING

Before attempting maintenance or repair procedures, ensure that power to pulper and to Hydrapurge has been shut off and circuit breakers are locked and tagged to guard against accidental pulper or Hydrapurge start up. Also make sure that air supply to Hydrapurge is shut off, locked out, and tagged. Bring the pulper and Hydrapurge to ZMS. Additionally, follow your company's established safety procedures.

To prepare for a maintenance check, shut down the unit according to "Normal Shut Down" on page 44 and bring it to a zero mechanical state (ZMS) and lockout all sources of energy.

A wash down of internal parts and surfaces may be required.

The following table is based on past experience and represents the anticipated minimum requirements for keeping the Hydrapurge in good operating condition. The frequencies indicated in the schedule assume nearly continuous operation under normal load conditions. They may be adjusted to suit local operating conditions, but the intervals between maintenance actions should not be increased unless there is good data to support the change

Components Requiring Routine Maintenance

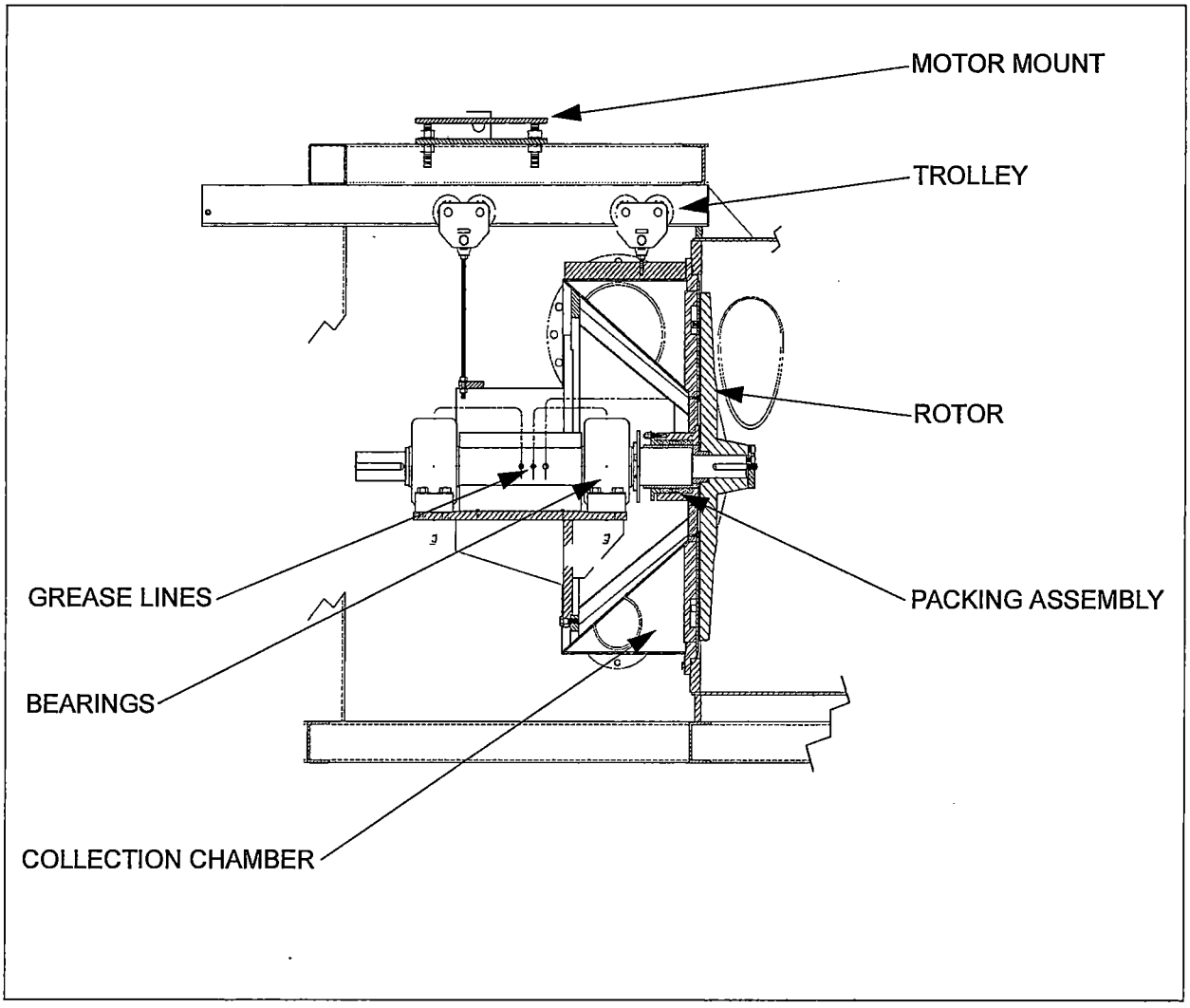
COMPONENT	SERVICE	FREQUENCY
Bearings	Lubricate.	weekly
V-belts and sheaves	Check tension, alignment, and wear.	weekly
Seals and gaskets	check sealed and gasketed joints. Replace as needed.	weekly
Rotor	Examine rotor for excessive clearance. Correct if necessary	monthly

COMPONENT	SERVICE	FREQUENCY
Screen plate	Check screen plate for hole plugging and wear of debris deflector bars. Correct as necessary.	monthly
Hydrapurge	Disassemble and inspect. Replace parts as needed. Pay particular attention to bearings, seals, gaskets, and drive belts.	annually
Packing gland	Check for excessive water leakage. Adjust gland or replace packing as needed.	each shift
Packing box	inspect sleeve and packing for wear	during shut downs

8.2 LUBRICATION

Bearings

Once each week, lubricate both bearings with a moderate amount of grease (approximately two or three squirts from a hand-held grease gun). Use only a No. 2, water-resistant grease. Before applying the grease gun, wipe the grease fittings clean to prevent entry of any contaminant with the grease. After lubricating, wipe up any excess grease with clean, lint-free wipers. Refer to the motor manufacturer's instructions for motor bearing lubrication requirements.



Lubrication Ports

8.3 SERVICING COMPONENTS

The maintenance procedures in the following sections assume that major corrective maintenance tasks will be limited to removing, disassembling, and reassembling major components or parts of the Hydrapurge. Although some parts may be refurbished or repaired when severely worn or damaged, the down time required while waiting for parts to be repaired usually is more expensive then replacing the parts with new or factory reconditioned spares. For this reason, no instructions are included for refurbishing parts.

The following general procedures apply to all maintenance actions and are not repeated with each individual procedure. The maintenance technician should be thoroughly familiar with the general procedures before starting any disassembly or other maintenance action.

Preparing for Disassembly (General Procedures)

Before starting to disassemble the Hydrapurge, make certain that the following preparatory steps are taken which will simplify the operation and also make it safer.



WARNING

De-energize the drive motor and tag its circuit breaker before starting any maintenance procedures. Bring the unit to ZMS. Voltages capable of inducing severe shock are present in the motor. An accidental start during maintenance could cause severe injury to the maintenance technician.



WARNING

Do not attempt to manhandle parts weighing more than 45 lb (20 kg.) without the help of another person or a hoist. Two-man lifts should not exceed 100 lb (45 kg.).

- Shut down Hydrapurge, tag, and lockout controls and drive motor circuit breakers to prevent inadvertent starting. Bring unit to ZMS.
- Determine whether or not the Hydrapurge was properly cleaned and flushed as part of last shut down. Ensure that all related valves are in proper fail-safe position and that necessary steps have been taken to prevent valve operation.
- De-energize power supply to drive motor and tag its circuit breaker to guard against accidental start up. (It is good practice to disconnect electrical leads at motor as an added precaution).
- Disconnect water supply to packing box.

Cleaning and Inspecting Parts

After disassembling the Hydrapurge, clean all parts in a suitable solvent to remove scale or contaminants. After cleaning, allow the parts to air dry or wipe them dry with clean, lint-free rags. Cover reusable bearings with grease-resistant paper or plastic sheets until time for reassembly.

Protect all other parts with suitable coverings to avoid damage until time for reassembly.

After cleaning parts, inspect each part for signs of wear, corrosion, galling, or pitting. Bearings that show signs of any of these faults must be replaced. Other parts may be kept in service provided the fault will not interfere with operation. Deep scratches, gouges, or deformations are causes for replacing parts.

Packing, O-Rings, Gaskets, and Seals

It is good maintenance practice to replace O-rings, gaskets, seals, and packing each time they are disturbed for disassembly. The decision to replace or re-install such parts must be made individually on a basis of cost, availability, and condition. It is frequently false economy to reassemble a machine with new or refurbished parts only to have a faulty O-ring fail shortly after the job has been completed. Should an inspection of an O-ring or other seal reveal any sign of deterioration, cracking, change in color, embrittlement, or other abnormal condition, replace it immediately.



WARNING

Don't go through valve to access rotor.

8.4 ROTOR CLEARANCE ADJUSTMENT

Gaining Access to Rotor

- Achieve ZMS.
- Disconnect piping from the stock discharge flange of the collector.
- Remove cap screws that secure the collector to the Hydrapurge body.
- Slide the collector away from the Hydrapurge body on the trolley provided.
- Remove the O-ring from the collector fit. Inspect and replace if it isn't in excellent condition.
- Gain access to the rotor by unbolting the collection chamber from the tub. Back out the collection chamber (the extraction chamber includes the shaft and the rotor assembly) to provide working area to gain access to the rotor and extraction plate.
- Remove the belt guards.

Increasing Rotor Clearance

- Loosen socket head cap screws on the inner circle of bolts on the rotor hold down cap.
- Tighten the center set screw to increase the rotor clearance.
- When the clearance is adjusted, retighten the socked head screws.

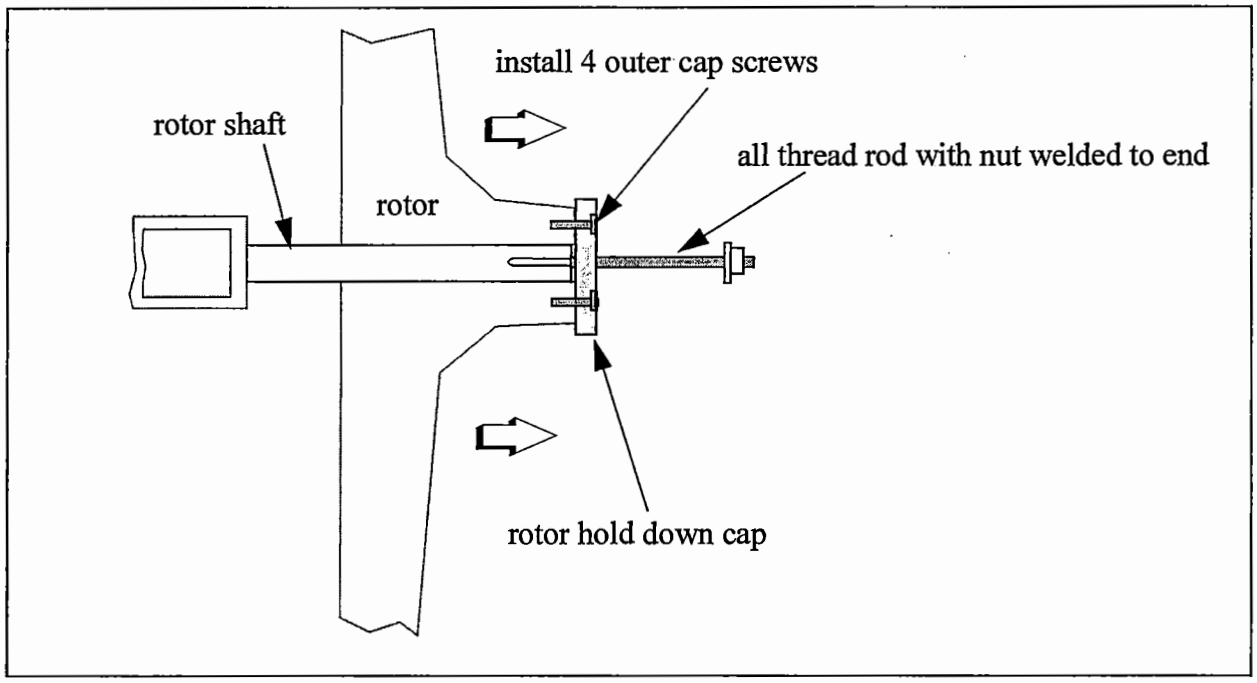
Decreasing Rotor Clearance

- Loosen center set screw.
- Tighten the socked head screws on the inner bold circle until the desired rotor gap is obtained.
- When the clearance is adjusted, tighten the center set screw.

8.5 ROTOR REMOVAL

Use the following steps to remove the rotor from the Hydrapurge.

- Achieve ZMS.
- Drain and flush Hydrapurge.
- Disconnect drain accept line, V-belts, belt guards, and packing water
- Remove bolts which connect the feed chamber to the collection chamber.
- Slide the collector/rotor assembly to the full open position while supporting the collector chamber on the provided trolley assembly.
- Use the rotor hold down cap when removing the rotor.
- The rotor may be removed by removing the four inner bolts, which screw into the end of the shaft. Using the center threaded hole, install the all-thread rod with a nut welded to the end to serve as a jack bolt.
- A threaded hole is provided in the outer tip of one rotor arm for lifting.
- A tapped hole is provided in one rotor vane for an eyebolt to suspend the rotor when it comes off of the shaft. If tapped holes are no longer there due to wear, weld an eye bolt directly onto the rotor arm.



Rotor Removal

8.6 ROTOR INSTALLATION

Use the following steps to install the rotor to the Hydrapurge.

- Achieve ZMS.
- Assemble the extraction plate.
- Prepare to place the rotor onto the shaft by fitting the key into the shaft and the rotor key way.
- Check the shaft and rotor fit for dents and burrs.
- Apply a thin coat of waterproof grease to the shaft and rotor fit.
- Place the O-ring in the groove provided in the rotor.
- As the rotor is started onto the shaft, check the alignment of the shaft key with the rotor key way.
- the rotor should slide onto the shaft by lightly tapping it into position.
- To adjust the running clearance, assemble the rotor cap.

To decrease the rotor gap, loosen the half dog set screw in the center of the rotor cap and tighten the inner row of bolts. To increase the rotor gap, reverse this procedure.

8.7 DISASSEMBLING THE ROTATING MECHANISM

- With the unit at zero mechanical state and the rotor and rotor shroud removed, as described previously, proceed as follows.
- Refer to the certified drawings while reviewing this procedure.
- Disconnect packing water line.
- Remove packing gland nuts and slide packing gland back on shaft.
- Remove packing and lantern ring.
- From inside Hydrapurge vat, remove cap screws that secure the packing box and remove the packing box.
- Remove the driven pulley by removing screws and bushings that secure the pulley to the shaft. Retain the key for use at reassembly.
- Remove the backplate of the belt guard by removing the screws that secure the guard supports.
- Remove the cap screws that secure the bearing caps. Then remove the bearing caps and seals.
- Lift the shaft with the bearings out of the lower bearing housings and take to a clean work area.
- Remove the bearing locknut and bearing lockwashers from the outboard or drive end bearing.
- Remove the bearing and tapered sleeve from the sheave end of the shaft.
- Remove the bearing locknut and bearing lock washer from the inboard bearing.
- Remove the inboard bearing and tapered sleeve from the sheave end of the shaft.
- Inspect the replaceable packing wear sleeve and replace if required.

8.8 INSTALLING NEW BEARINGS

- Refer to certified drawings.
- Clean shaft and check for straightness. The bearing fits, sleeve area, and rotor fit should not be more than 0.004 of an inch total indicated runout.

NOTE: Assemble and adjust the bearings according to the bearing manufacturer's specifications.

- Apply a thin coat of light oil to clean shaft surface. Install V-ring seal.
- Use a press to install bearings on shaft, and use a press to install shaft and bearings in bearing support housing.
- If a bearing must be heated to fit on shaft, place bearing in clean oil heated to 250 degrees Fahrenheit (121 degrees Centigrade) for about 15 minutes. Be sure to place supports under bearing to keep it away from bottom of container. If it touches container, it may overheat and distort.
- Assure that bearings are properly lubricated after installation and prior to turning on power to Hydrapurge.
- Always install new grease seals, O-rings, and gaskets during reassembly.
- Slide packing gland onto inboard end of shaft.
- The inboard bearing is the *held* bearing. Slide tapered sleeve onto shaft and position against retaining ring.
- Slide bearing over shaft and onto tapered sleeve. Adjust clearance with locknut according to instructions given in your bearing manual.
- Slide spacer ring for outer race of inboard bearing onto shaft.
- The outboard or drive end bearing is the *free* bearing.

8.9 INSTALLING SHAFT AND BEARINGS

- Use a press to install bearings on shaft, and use a press to install shaft and bearings in bearing support housing.
- If a bearing must be heated to fit on shaft, place bearing in clean oil heated to 250 degrees Fahrenheit (121 degrees Centigrade) for about 15 minutes. Be sure to place supports under bearing to keep it away from bottom of container. If it touches container, it may overheat and distort.
- Assure that bearings are properly lubricated after installation and prior to turning on power to Hydrapurge.
- Always install new grease seals, O-rings, and gaskets during reassembly.
- Clean lower halves of the pillow blocks, which should be in the undisturbed mounted position on the Hydrapurge bearing bracket. (If it is necessary to replace the pillow block housings, complete and thorough shaft realignment steps will be required on re-assembly.)
- Install shaft and bearings in the lower halves of the pillow blocks. Make sure spacer ring for the inboard bearing is properly placed. The outboard bearing and tapered sleeve are now adjusted to center the outer bearing race in the recess of the pillow block housing.
- Tighten locknut to seat bearing on tapered sleeve and adjust bearing clearance per bearing manual.
- Hand pack both bearings with proper grease. Fill the lower half of the pillow block 1/3 full.
- Clean upper halves of pillow blocks, re-install.
- Check shaft alignment by mounting dial indicator on shaft and indicating to machine fit for the packing box flange. Shaft should be true to within .010 of an inch total indicated runout. Re-install packing box. Make sure sealing O-Ring is in place.

8.10 REASSEMBLING THE HYDRAPURGE

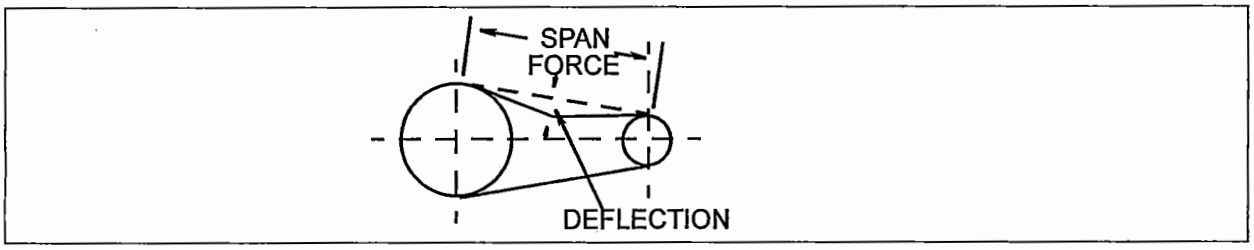
The Hydrapurge can be reassembled by reversing the order and sense of the procedures used for disassembly. The following points should be noted during reassembly.

- Re-install the extraction plate.
- Re-install rotor and adjust clearance.
- Repack packing box and reconnect packing water lubrication.
- Replace sealing O-ring on collector housing. Roll into place and bolt-up to Hydrapurge vat.
- Re-install driven sheave and align.
- Re-install belts and tension.
- Re-install all guards.
- Reconnect stock piping to collector discharge flange.
- Review and complete the Post-Maintenance Check-out.

8.11 DRIVE BELTS

Inspection

Once each week, inspect drive belts for excessive slack or wear. If belts are frayed, cracked, or otherwise damaged, replace them. Recheck the tension of new belts several times during the first 50 hours of operation and readjust tension as necessary. Thereafter, the weekly check is adequate.



Belt Tension Measurement

Adjustment

Increasing Tension

- Loosen locking nuts above motor plate several times.
- Raise motor evenly by turning all 4 jacking nuts under motor plate in small equal increments.
- When motor has been raised enough to provide required tension, tighten locknuts above motor plate. Verify proper sheave alignment.

Decreasing Tension

- Turn jacking nuts under motor plate equally and alternately, approximately one turn at a time, to lower motor evenly.
- When motor has been lowered enough to provide required tension, tighten locknuts above motor plate.

Replacing Belts

CAUTION

Hydrapurge drive belts are a matched set. Do not replace individual belts. Replace entire set even if only one belt set is worn or damaged.

- Shut down Hydrapurge, tag and lockout controls and drive motor circuit breakers to prevent inadvertent starting. Bring unit to ZMS.
- Remove belt guards.
- Using jacking nuts under motor plate, lower motor evenly until belts are slack enough to allow them to clear grooves of drive pulley.
- Remove and discard old belt set.
- Install new belt set on pulleys, and adjust tension as described above.
- Replace guards and remove tags from controls.

- During first 50 hours of operation with new belts, check and adjust tension several times. This is required because new belts will stretch.

V-Belt Drive

CONDITION	POSSIBLE CAUSE	TO CORRECT
belt slips (sidewalls glazed)	oil on belts	replace belts
	not enough tension	increase tension
mismatched belts	new belts installed with old	replace belts in matched sets
sheave grooves worn unevenly or improper groove angle	shafts not parallel	replace sheaves
		align drive
belt turned over	broken cord caused by prying	replace belts correctly
	impulse loads	apply proper tension
	misalignment	realign drive
	worn sheave grooves	replace sheaves
	excessive vibration	check drive and equipment mounting
		consider banded belts
belt breaks	shock loads	apply proper tension
	heavy starting loads	apply proper tension
		use compensator starting
	belt pried over sheaves	use compensator starting
		replace belts correctly
	foreign objects in drive	replace belts correctly
		provide drive shroud
belt wear	sheave grooves worn	replace sheaves
	mismatched belts	replace with matched belts
	belt slippage	increase tension
	sheaves misaligned	align sheaves
	oil or heat condition	eliminate oil
		ventilate drive

8.12 SEALS, GASKETS, AND PACKING

Seals and Gaskets

Once each week, make a visual inspection of all external seals and gasketed joints to assure that leakage is kept to an acceptable level. Some leakage from the shaft packing is required to lubricate the shaft as it turns in the packing. When properly adjusted, the packing gland will drip no more than a few drops of water per minute. Tighten the gland as needed by taking up evenly and alternately on the gland nuts. When tightening the gland can no longer control the leakage, replace the packing.

Packing Replacement

To replace the packing:

- Shut down Hydrapurge, tag, and lockout controls and drive motor circuit breakers to prevent inadvertent starting. Bring unit to ZMS.
- Shut off fresh water supply to packing gland.
- Remove gland adjusting nuts, and slide gland out of and away from packing box. Allow gland to hang on shaft.
- Using a suitable tool, reach in and pull packing and lantern ring out of space between seal sleeve (on shaft) and packing box. Note number of packing rings on either side of lantern ring.
- Turn on packing water supply to make sure that the packing water line is clear. If required, clear any plugs in this line. Contamination could restrict water distribution to the packing.
- Clean lantern ring to remove any corrosion or contamination that could restrict water distribution to packing.
- Insert new packing and re-install lantern ring being careful to insert it at proper location between packing rings. Gland can be used as a tamping tool to seat rings and lantern ring.
- Re-install gland and gland nuts loosely. Restore fresh water flow to seal, and adjust leakage.
- Return Hydrapurge to operation and maintain a close watch for seal leakage. As packing rings wear in and adjust to sleeve and housing, it will become necessary to retighten gland nuts.

8.13 POST MAINTENANCE CHECKOUT

After any maintenance procedure that requires opening or disassembling any part of the Hydrapurge, make the following simple checks before restoring the Hydrapurge to service.



CAUTION

Do not start or apply power to the drive motor until the following steps have been completed.

- Check to assure that water supply to packing box has been reconnected and that bearings have been properly lubricated.
- Check tension of drive belts.
- Check that nuts on motor table threaded adjustment rods have been tightened.
- Turn on clear water supply to packing box and check tightness of packing gland. There must be some leakage from gland to assure proper lubrication of packing.
- Manually turn the sheave to assure that there is no binding, scraping, wobble, or unusual noise.
- Check to make sure that all guards have been re-installed.
- Correct any abnormal conditions found before starting drive motor.
- Alert all personnel that the Hydrapurge will be returning to operation.
- Restore power to drive motor, and reconnect the valve air lines.
- Test all reconnected valves and bump the Hydrapurge motor to complete the post-maintenance checkout.

9.0 SERVICE PARTS

9.1 RECOMMENDED SPARE PARTS

We recommend that you keep the following parts on hand for repairs and routine maintenance. This list does not include specific part numbers for your unit. You should refer to your certified drawings for individual part numbers or, if you would like a list of part numbers for your unit, contact:

Kadant Black Clawson Inc.
7312 Central Parke Boulevard
Mason, Ohio 45040
phone: 1-513-229-8100
North America emergency 24-hour service: 1-800-448-5422
global emergency 24-hour service: 1-888-535-3993
fax: 1-513-229-8197

IMPORTANT: When ordering spare parts or requesting a parts list, refer to the certified drawings and give the item number, drawing number, and part description, along with the product numbers. (Product identification numbers include the serial number, shop order number and model number.) Generally, allow eight to twelve weeks for delivery.

Do not modify the equipment without written authorization from Kadant Black Clawson. Unauthorized modification may impair the function, shorten the machine life, and render built-in safety features useless.

Recommended Spare Parts

Description	Quantity
Rotor	one
Screen plate	one
Lip seal	one
Shaft sleeve with O-ring	one
Packing gland	one
Packing box with O-ring	one
Lantern ring	one
Rotor O-ring	one
Cap O-ring	one
Deflector bar	one set

10.0 GLOSSARY

Term	Synonyms, Definitions, and Functions
CFM	cubic feet per minute
DCS	distributed control system
D.O.D.	diameter of discharge
EMI	electromagnetic interference
expansion bearing	free bearing
GPM	gallons per minute
HIC	hand indicator controller
HP	horse power
kPa	kilopascal
kW	kilowatt
LPM	Liters per minutes
lantern ring	seal water ring, packing box bushing A nylon, Teflon, cast iron, or brass ring in a packing arrangement at which point water is injected.
non-expansion bearing	held bearing
OCC	old corrugated container
OD T/D	oven dried tons per day
PSI	pounds per square inch
PSIG	pounds per square inch gage In this manual, PSI and PSIG have the same meaning.
packing box	stuffing box A machined passage at the bottom center of a pulper which the shaft passes. The packing box contains compressed fibrous packing to control leakage.
packing box water	gland water, seal water Water added to a packing box at the lantern ring to cool and lubricate the packing and shaft sleeve.

Term	Synonyms, Definitions, and Functions
packing sleeve	wear sleeve A replaceable sleeve mounted to the shaft on which the packing *rides*.
T/D	tons per day
ZMS	zero mechanical state - (1) Every power source that can produce a machine member movement has been locked off; (2) Pressurized fluid (air, oil, or other) power lockoffs (shut-off valves), if used, will block pressure from the power source and will reduce pressure on the machine side port of that valve by venting to atmosphere or draining to tank; (3) All accumulators and air surge tanks are reduced to atmospheric pressure or treated as power sources to be locked off, as stated in paragraph 1 and 2; (4) The mechanical potential energy of all portions of the machine is at its lowest practical value--so that opening of pipe(s), tubing, hose(s), or actuation of any valve(s) will not produce a movement that could cause injury; (5) Pressurized fluid (air, oil, or other) trapped in the machines lines, cylinders, or other components is not capable of producing a machine motion upon actuation of any valve(s); (6) The kinetic energy of the machine members is at its lowest practical value; (7) Loose or freely movable machine members are secured against accidental movement; (8) A workpiece or material supported, retained, or controlled by the machine shall be considered as part of the machine if the workpiece or material can move or can cause machine movement.