

PFLOW VERTICAL LIFTS

The Nation's Largest Manufacturer of Vertical Lifts

PFlow

Industries, Inc.



The illustrations depicted in this manual are not to scale or to detail and are for reference only.

MAINTENANCE & OWNER'S MANUAL

SERIES F

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Documentation

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System Modifications/Disclaimer

Mechanical or electrical modifications performed on the VRC not approved by PFlow Industries, Inc. may also void any warranty and/or service agreements. Please contact the PFlow Sales or Service Department at one of the numbers listed above for assistance with service modifications.

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INTRODUCTION

Thank you for purchasing a PFLOW INDUSTRIES, INC., Series F, Vertical Reciprocating Conveyor (VRC). As the nation's largest manufacturer of VRCs, we are confident that your unit will provide you with many years of reliable service.

CODE REQUIREMENTS - VRCs are NOT elevators. Your unit is designed for the movement of materials only, up to its rated capacity, from one level to the next. VRCs have their own national code (ANSI/ASME B20.1) and are specifically exempt from the National Elevator Code. All electrical designs and components are in accordance with National Electric Code (NEC) requirements. Local codes may require initial inspection of the installation and periodic inspection and testing of the unit.

Some states require special components and have specific guidelines regarding how the equipment must be installed, inspected, and tested. If we know in which state the equipment will be located, and if we are kept informed of state and local requirements, Pflow will incorporate the components into the order, as approved by the customer, and also provide any pertinent information, as called out on the general arrangement drawing, related to the installation of the equipment. We will not be on site for the testing, but we strongly advise that the installer be there.

If at any time you have questions about your state's requirements, please feel free to call.

NOTE

The information and illustrations in this manual are intended only as an aid to understanding the VRC's general installation. It does not cover every possible contingency or circumstance regarding non-standard options or site conditions.

If you have a problem, call Pflow at (414) 352-9000, between 8:30 A.M. and 5:00 P.M., CST, Monday through Friday. Ask for the Product Support Department and have your serial number ready.

Parts - Pflow Industries maintains a complete stock of, or has access to, all replacement components. We keep detailed records of all equipment sold. If something is damaged in shipment, is defective or missing, contact us immediately.

Service - Our Product Support Department is available to assist your maintenance personnel with any questions or problems they may have regarding the equipment.

Warranty - Our warranty procedures can be found in the back of this manual. Prior authorization must be obtained from Pflow before commencing work of any kind.

Feedback - Let us know how we are doing. A questionnaire is included in the installation manual. Please fill it out and return it to us. We can't prevent a problem if we are not aware of it.

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F Series

SAFETY

To ensure your safety and the safety of those around you, it is important that you read, understand, and follow ALL the safety precautions relative to a particular task. Safety precautions in this manual are labeled with the alert symbol followed by the word DANGER, WARNING or CAUTION.

DANGER

When you see this symbol, it means that serious injury or death is likely to occur if the instructions are not followed carefully.

WARNING

When you see this symbol, it means that the potential for personal injury is high if directions are not followed carefully.

CAUTION

When you see this, it means that the potential for damage to the equipment is high if directions are not followed carefully.

NOTE

This term is used to provide additional information to help clarify instructions.

DANGER

HIGH VOLTAGE. Failure to follow proper procedures when performing electrical installation or service may result in serious injury or death.

DANGER

DO NOT ride this equipment. Riding may result in injury or death. **VRCs ARE NOT ELEVATORS.**

DANGER

DO NOT walk or work under a raised platform.

DANGER

If you can open a gate when the unit is not at that level, or the unit will operate with a gate open, a safety device is not working and could result in serious injury or death.

WARNING

DO NOT operate the unit if either the gates or interlocks are not functioning properly.

CAUTION

DO NOT exceed rated capacity.

Electrical Safety Precautions

⚠ DANGER

Always assume that a circuit is not safe until you are sure that it is dead. Make sure that it cannot be energized after you start working on it. Follow OSHA procedures for locking out the control panel ANYTIME maintenance or service is being performed on the unit. Put a lock and tag on disconnects, breakers, and/or pulled fuses.

- Use a voltage tester on circuits - **DO NOT USE YOUR FINGERS**. Use fuse pullers to change a fuse; **NEVER** use fingers, pliers or screwdrivers. Covers on exposed electrical devices or wires **MUST** be installed to protect personnel from injury or shock.
- **ALL** metal connection boxes, switch boxes, starting boxes, transformer shells, and motor frames must be grounded to prevent shock to personnel.
- When using a portable electric meter, **DO NOT** connect one wire and leave other wires dangling loose. Anyone touching it will receive a shock through the meter.
- Before powering a circuit on, make sure that all is clear. This is necessary in order to protect personnel from injury and to prevent damage to the equipment.
- Avoid accidental contact with equipment or conductors which are known to be live or are **NOT** known to be dead. If it is necessary to work on equipment while it is hot, extra care must be observed. Always test and repair equipment that indicates a warning of unsafe conditions by giving a nonfatal shock. **NEVER** assume that because the warning shock is nonfatal, the next shock will also be nonfatal.
- **TAKE TIME TO BE CAREFUL!** Following safety precautions and using common sense will prevent injury, mutilation, or death.

Safety Precautions When Working on Live Circuits or Equipment:

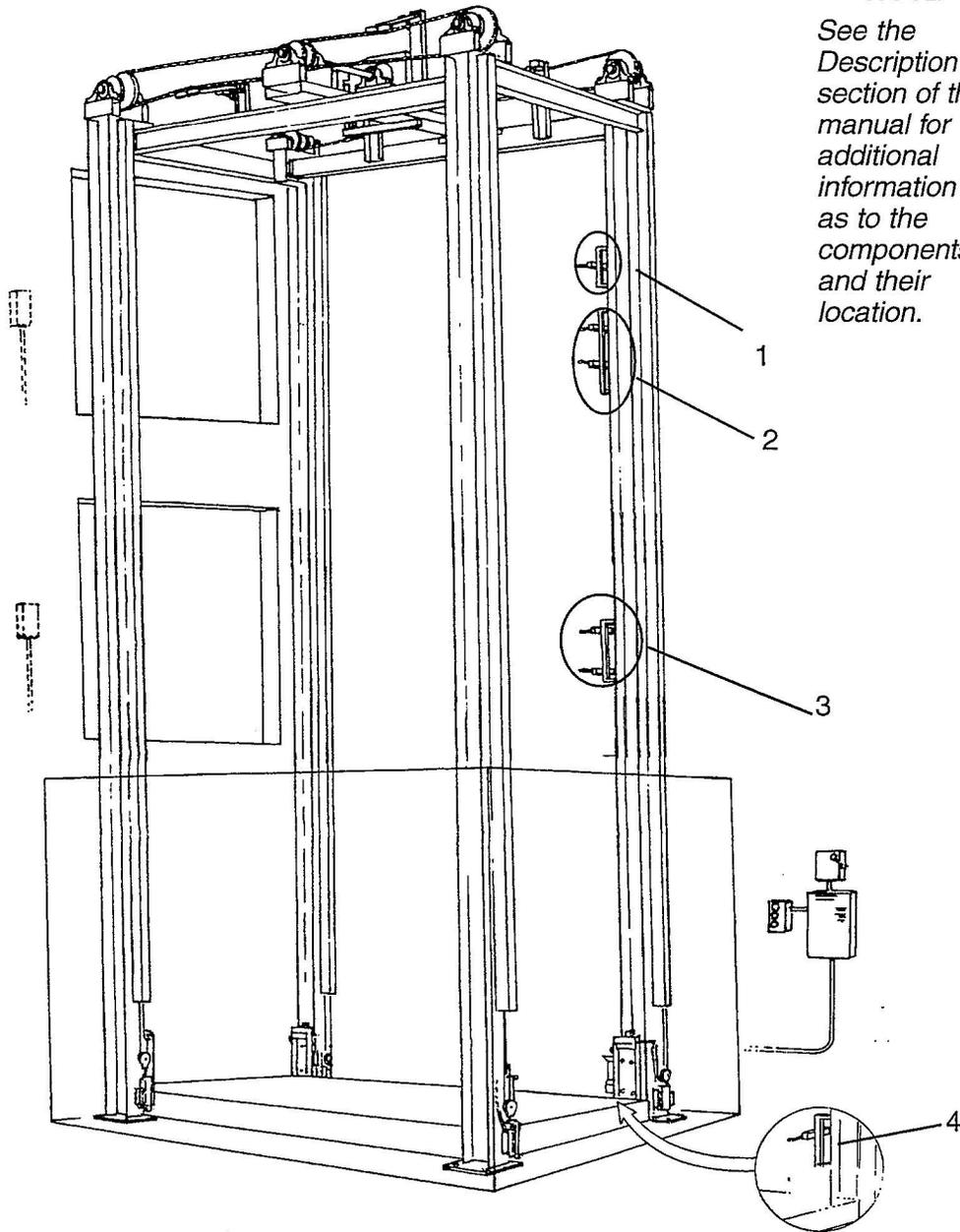
When electrical repair or maintenance work is required that prohibits de-energizing the circuits involved, extreme measures of safety must be used. The work should be accomplished only by well-supervised personnel who are fully aware of the dangers involved. Every care should be taken to protect the person performing the work and to use all practical safety measures. The following precautions **MUST** be taken:

- The person doing the work should not wear a wristwatch, rings, watch chain, metal articles, necklaces or loose clothing which might make accidental contact with live parts or throw some part of his body into contact with live parts.
- Clothing and shoes should be as dry as possible.
- Insulate the worker from ground by covering any adjacent grounded metal, with which he might come in contact, with insulating material. Suitable insulating materials are dry wood, rubber mats, dry canvas, dry phenolic material, or even heavy, dry paper in several thickness. Be sure that it has no holes and no conducting materials embedded in it. Cover sufficient area so that adequate space is permitted for worker movement.
- Cover working metal tools with an insulating rubber tape (not friction tape) as much as is practical.
- **DO NOT** stick a bare screwdriver or other tool into a hot fuse box.

F Series

NOTE

See the Description section of this manual for additional information as to the components and their location.



1. Overtravel Limit Switch
2. Upper Floor Level Limit Switch
3. Intermediate Floor Level Limit Switch
4. Lower Level Floor Level Limit Switch

MECHANICAL OVERVIEW

Each Series F Vertical Reciprocating Conveyor (VRC) has a frame, drive base, and four corner sprocket column assemblies, a moving carriage (platform), and interlocked safety gates or doors. In addition, there is a main control panel and one push button station per level. More information on the electrical components can be found in areas within this section of the manual.

The **FRAME** consists of four vertical lift sprocket columns. These are anchored to the floor at the first level, positioned by the drive base, bracing, drive and channel struts at the top, and braced to the building structure. Exact bracing used may vary by application. See Figure 2.

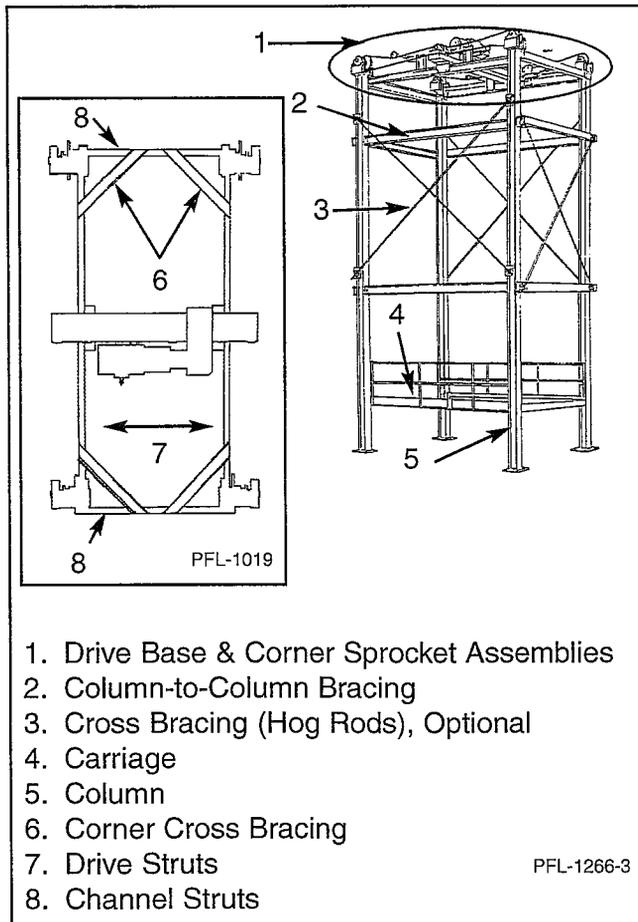


Figure 2

The **DRIVE BASE** consists of a motor, brake, gear reducer (commonly referred to as a gear motor assembly), drive sprockets, a drive shaft, bearings, and support structure. Roller chain connects the drive sprocket on the shaft of the drive base assembly to the corner sprocket assemblies on top of each column.

The **CORNER SPROCKET** assemblies include a driven sprocket connected by the drive roller chain to the drive base assembly and the lift sprocket for the lift chain. The drive chain is connected to the larger driven sprocket that in turn moves the lift sprocket that raises and lowers the carriage by the lift chain. See Figure 3.

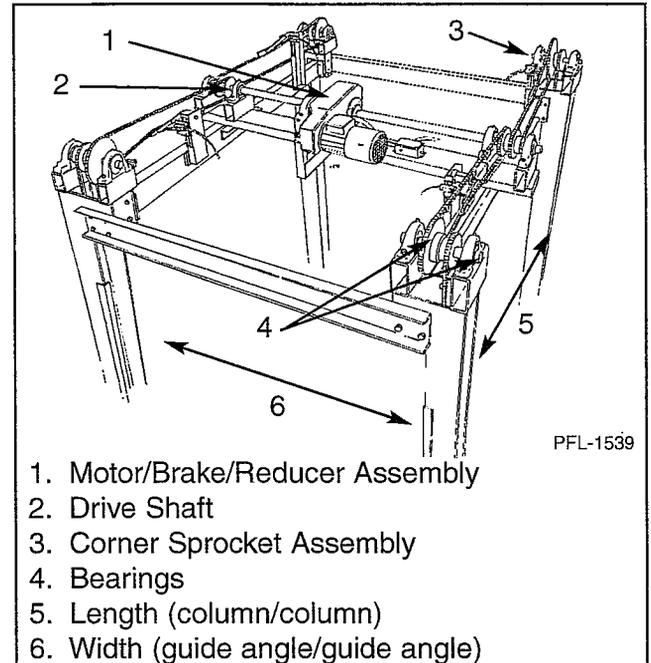


Figure 3

Each **COLUMN** has a guide angle on the front flange of the column to form a track and a chain guard tube on the face of the back flange. The tracks face each other across the lift width allowing the carriage to ride between them. See Figure 4.

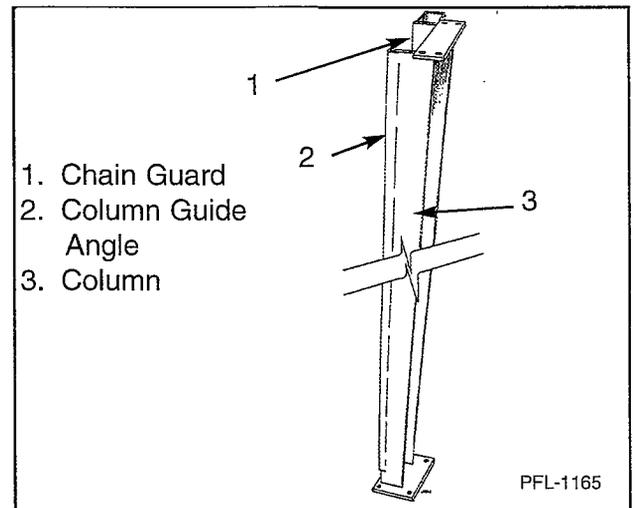


Figure 4

F Series

Inside each track, one end of a lift chain connects to a wheelblock assembly bolted to the carriage upright. The lift chain then goes up over the lift sprocket at the top of the column, returns down through the chain guard tube, and connects to the smaller tensioner chain. The tensioner chain then goes around a small sprocket on the chain tensioner and back up fastening to a bolt on the standoff on the carriage upright.

The tensioner sprocket is spring-loaded by a chain tensioner block that keeps tension on the lift and tensioner chain. If the tensioner chain is pulled too tight or goes slack, the tensioner limit switch is activated to shut off the drive unit. See Figure 5.

The chain tension is adjusted by the chain tensioner assembly turnbuckle.

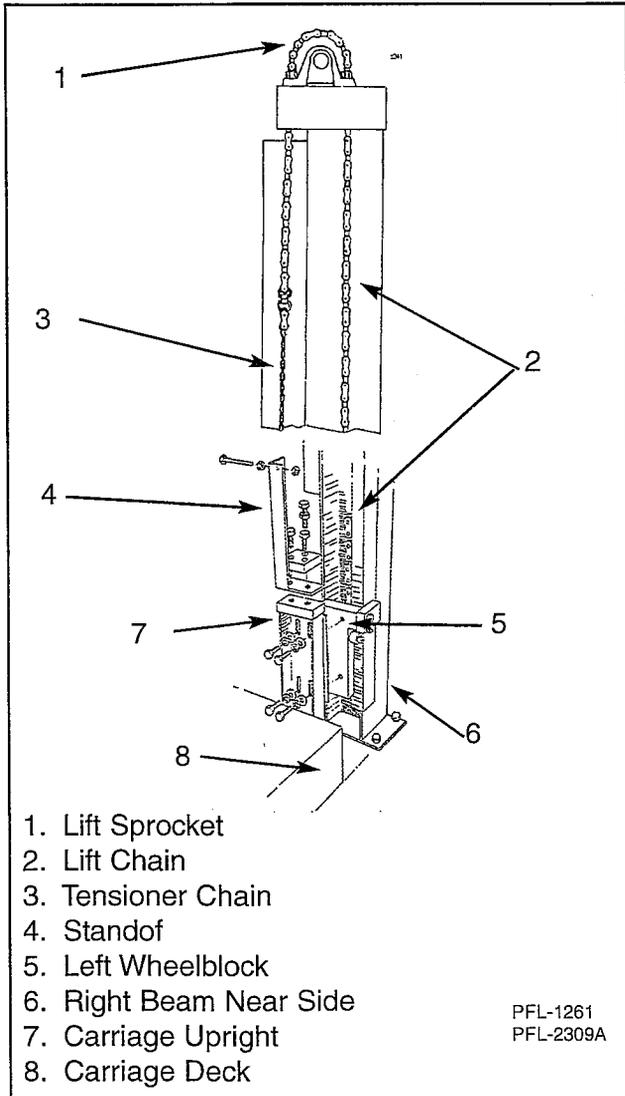


Figure 5

The **CARRIAGE** consists of a deck, uprights, railings (not shown), and four wheelblocks. The wheelblocks are bolted to the carriage uprights thus allowing the main wheels to ride within the lift column flanges and guide the carriage during travel. The wheelblock guide rollers capture the column guide angle. See Figures 5 and 6.

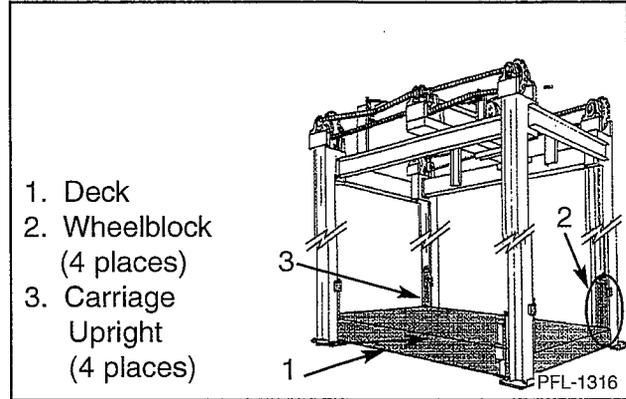


Figure 6

Each **WHEELBLOCK** has a mounting block, a wheel, and two guide rollers. The guide rollers locate the wheelblocks within the guide angle. Each wheelblock has a **SAFETY CAM** with teeth and a slide shoe. The shoe fits against the outside of the column guide angle, while the steel safety cam is pivoted on the mounting block and is spring-loaded. See the parts manual for exploded view. See Figures 5 and 7.

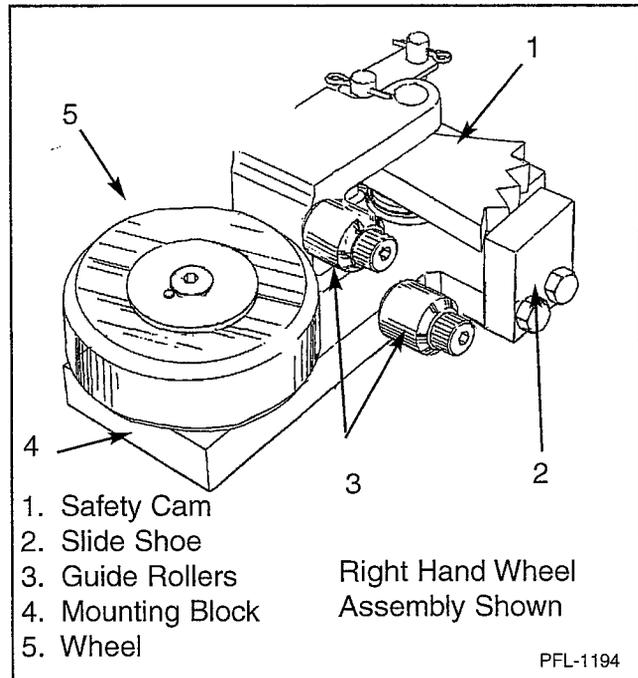


Figure 7

Mechanical Overview

Because the lifting chain connects to this safety cam, all lifting is done by the lift chain through the safety cam.

Should the lift chain or tensioner chain break or go slack, the safety cam spring will pivot the safety cam into a jam position within the column flange to stop the carriage from falling. The guide shoe on the outside of the guide angle helps to wedge the column flange between the guide shoe and the safety cam teeth. See Figure 8.

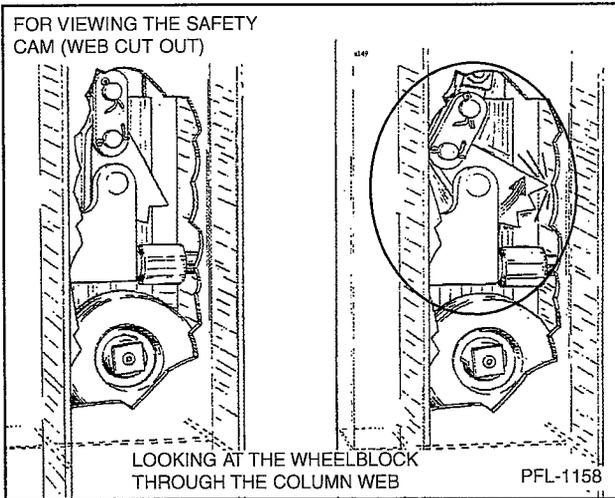


Figure 8

In accordance with ANSI/ASME B20.1, Pflow Industries supplies standard **ENCLOSURE PANELS** to be installed around the unit as required by site conditions. See Figure 9.

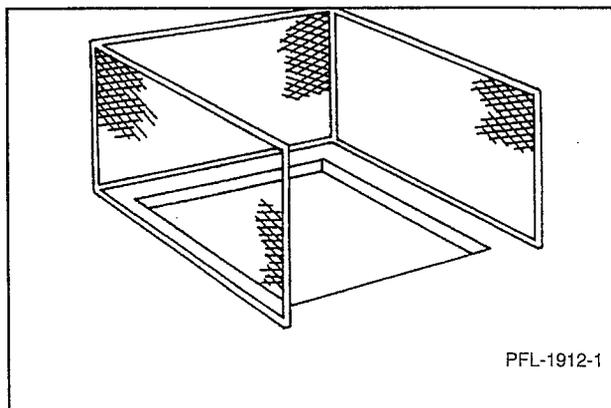


Figure 9

The panels are manufactured of steel angle frames and 18-gauge flattened expanded metal that will reject a ball 2" in diameter. Standard panels are 8' tall.

A safety **GATE** or door must be provided at each opening in the lift area at each level. All gates and/or doors accessing the lift area must be electro-mechanically interlocked (see page 11). The interlock prevents movement of the carriage when a gate is open. The opening of a gate when the lift is not present at a level is prevented by the mechanical interlock.. See Figure 10.

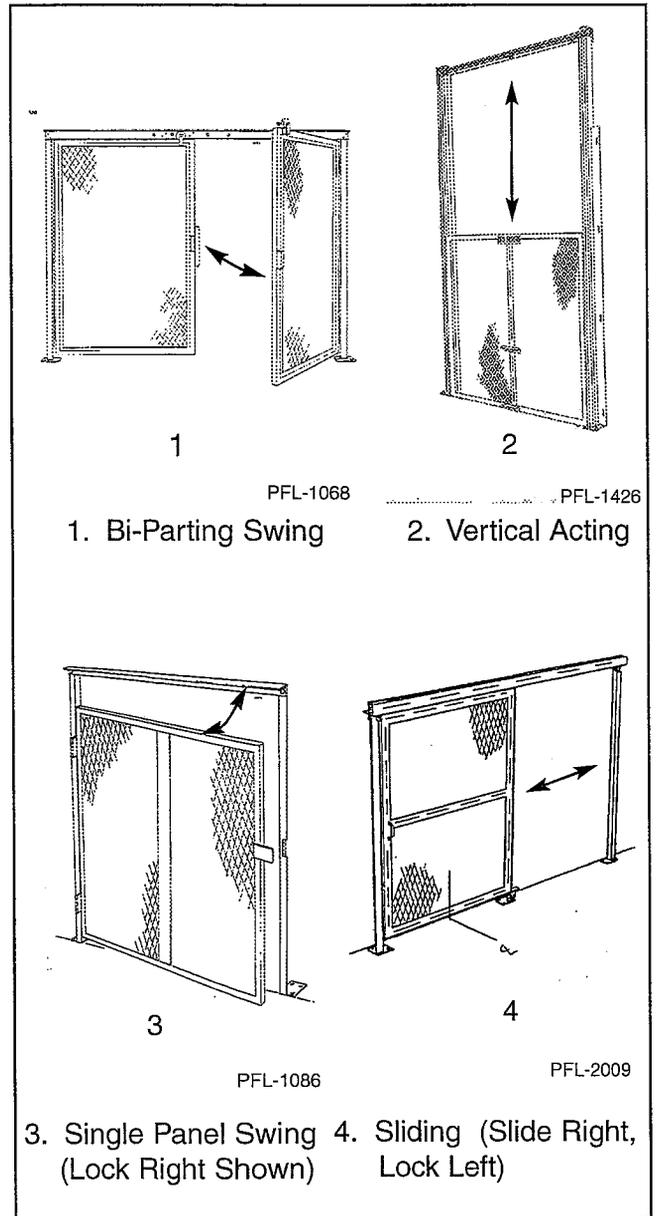


Figure 10

F Series

Pflow Industries uses various styles of interlocks depending upon the gate type and application. The Parts section of this manual contains views with part numbers. See Figure 11.

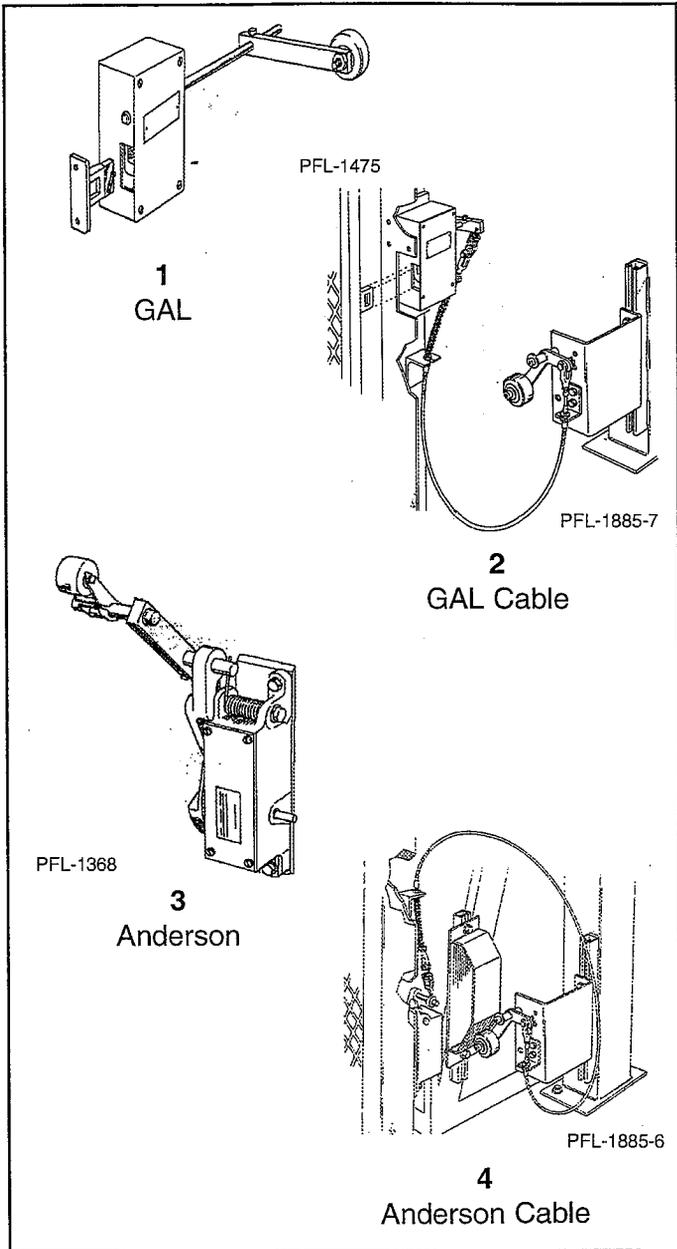


Figure 11

ELECTRICAL OVERVIEW

NOTE

The following is a standard description of the electrical wiring of the VRC ONLY. It DOES NOT include specifics on options available or ordered.

All electrical devices are tied into the **MAIN CONTROL PANEL**. It contains a fused transformer, which reduces the high voltage needed for the motor down to the voltage required to operate the control circuit, motor starter and push button stations. Overload heaters are provided to protect the motor should excessive current draw cause overheating. See Figure 12.

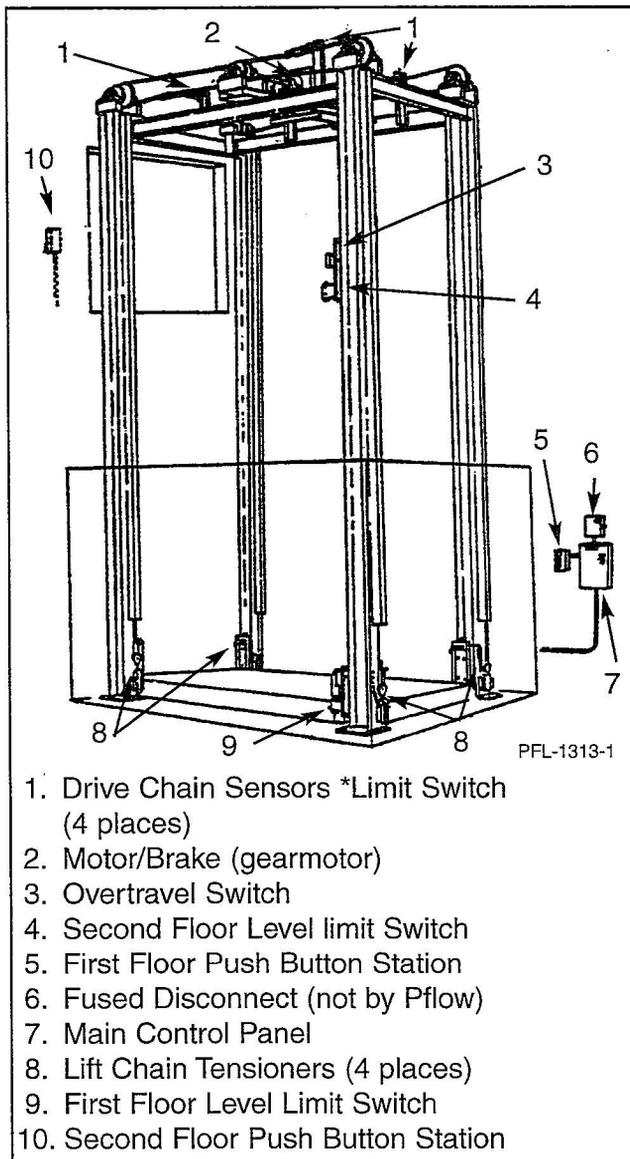


Figure 12

PUSH BUTTON STATIONS. One station is normally supplied for each level. ANSI/AME B20.1 code requires that they be remotely located so they cannot be activated by someone standing on the carriage. Each station has an UP, DOWN, and EMERGENCY STOP button.

The UP and DOWN switches are momentary contact. This allows the operator to depress the button and let go. The EMERGENCY STOP button is pushed to activate but will stay in and must be pulled back out for the unit to operate.

Required by NEC code, the **MAIN DISCONNECT** should be fused, lockable, and located within line of sight of the control panel. (Not supplied by Pflow.)

The **MOTOR/BRAKE** unit may have the brake prewired to the motor so that only the motor need be wired. Non-standard assemblies may be supplied and will require separate field wiring of these components.

There are eleven **CONTROL SWITCHES** incorporated into a standard two-level unit: one at each level to stop the carriage vertical travel, one upper carriage overtravel, four drive chain tensioners and four lift chain sensors. All switches require field mounting and wiring. Units servicing more than two levels require two additional switches for each intermediate level.

⚠ WARNING

All gates or doors accessing the lift area must be electro-mechanically **INTERLOCKED**. This requires electrical contacts to prevent the lift from operating if a gate is open when the carriage is at that level and mechanical locks to lock the gate until the carriage is at that landing.

Different types and styles of interlocks are supplied depending upon the type of gate and on-site conditions. Standard styles incorporate from one to four electrical components per gate.

SEQUENCE OF OPERATION

NOTE

For the unit to operate:

- All gates must be closed.
- Loads are not to hang over the edge or sides of the carriage.
- The load must be within the specified lifting capacity limit.

1. When the desired floor level button is pressed (Figure 13), the coil in the motor starter magnetically closes the high voltage contacts, and the power circuit to the motor starter (Figure 14) is completed to turn the motor in the needed direction.

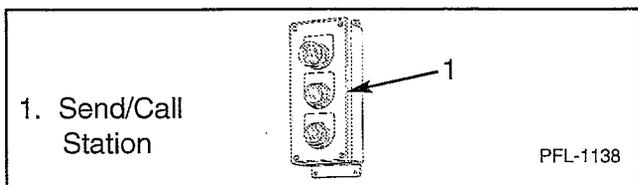


Figure 13

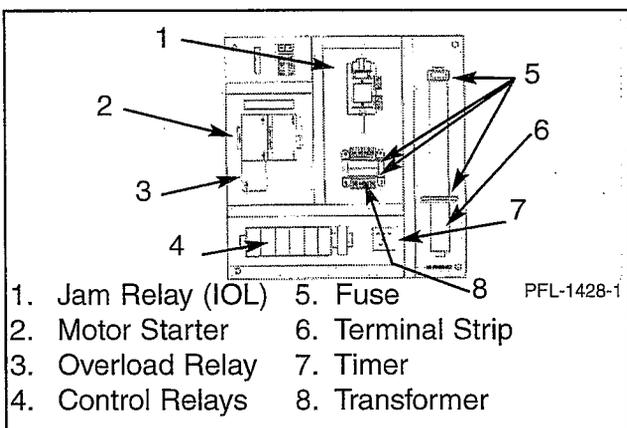


Figure 14

2. Now the brake is released. The motor turns the gears in the reducer, which in turn rotates the keyed drive shaft. The drive sprockets on the shaft turn resulting in the raising or lowering of the lift chains. (Because the motor starter is reversible, the direction of travel can be alternated.) The lift chains are fastened to the wheelblocks, which are bolted to the carriage upright the carriage raises or lowers
3. When the carriage arrives at the next level, the **floor level limit switch** (one per level) is activated by a carriage mounted cam. When activated, this switch cuts the power to the motor circuit, the motor starter contacts drop out (opens); the motor stops; and the brake is applied stopping and holding the carriage position. See Figure 15.

4. The carriage **overtravel limit switch** is a safety device mounted on the column above the top floor level limit switch. If there is a failure of the top floor level limit switch, this limit switch is activated by the carriage mounted cam on the side of the carriage, and it will send a signal to shut the unit down. Before activating the unit, have a qualified electrical controls technician find out why this occurred and correct the problem. See Figure 15.

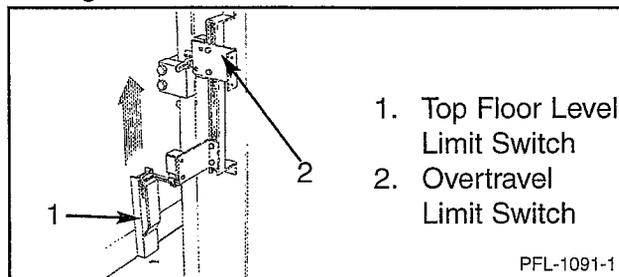


Figure 15

5. When excessive motor current draw causes overheating, the instantaneous overload (jam) overcurrent sensor relay will protect the lift motor by cutting off the power to the control circuit. This will happen when the unit is loaded beyond its rated capacity.
6. When the lift chain or tensioner chain goes slack or breaks, the lift chain tensioner switch will activate, (described in the Mechanical Overview) cutting off the power to the motor and applying the brake. The wheelblock safety cam will rotate and set on the column.
7. The drive chain tensioner limit switches are composed of an actuator mounted to a rubber tensioner, and a limit switch. The rubber tensioner is torqued to a position of approximately 30 degrees off the horizontal plane. The drive chain slack is removed with the rubber tensioner adjusted to this position.
8. The drive chain tensioner limit switch is mounted to the drive chain tensioner base and wired "normally open, held closed." If a drive chain becomes slack or is broken, the actuator arm will return to its static position, and the limit switch will open cutting power to the motor circuit. The drive motor stops, the brake is applied, and the carriage will stop. The unit will not operate until the drive chain is repaired and the tensioner readjusted. Before reactivating the unit, have a qualified electrical controls technician find out why this occurred and correct the problem.

OPERATION

BEFORE OPERATING THE LIFT, PLEASE READ, UNDERSTAND AND FOLLOW ALL THE SAFETY PRECAUTIONS LISTED BELOW.

⚠ DANGER

Malfunctioning interlocks may allow the door to be opened when the carriage is not present. **YOU MUST MAKE SURE CARRIAGE IS PRESENT BEFORE WALKING THROUGH DOORWAY.** If the carriage is not present, you could fall into the empty shaftway and be seriously injured or die!

⚠ DANGER

Door must be closed and locked unless carriage is present. Door interlock must be operational. It prevents door from being opened when carriage is not present. The door restricts personnel from falling into opening or from being struck by moving parts that could result in serious injury or death!

⚠ DANGER

DO NOT ride this equipment. Riding may result in serious injury or death! VRCs ARE NOT ELEVATORS.

⚠ DANGER

DO NOT walk or work under a raised carriage (platform). Secure the carriage during maintenance.

⚠ WARNING

Only trained persons shall be permitted to operate or maintain this equipment. Improper operation or maintenance may cause serious injury or death!

⚠ WARNING

If at any time proper operation or performance of your Pflow VRC is in question, DO NOT USE IT! Notify your supervisor or the proper maintenance people immediately.

CAUTION

DO NOT allow loads to overhang the sides of the carriage. This will result in damage to the equipment and merchandise.

CAUTION

DO NOT exceed the rated lift capacity.

TO OPERATE LIFT

- Close gate.
- Depress and release the appropriate push button to move the carriage to the desired floor. The carriage will stop when it reaches the appropriate level.
- When the unit has arrived at the appropriate level and comes to a complete stop, open the gate.
- If an emergency occurs when the carriage is moving, push the EMERGENCY STOP button. The button will keep the lift inoperative until the button is pulled back out. See Figure 18.

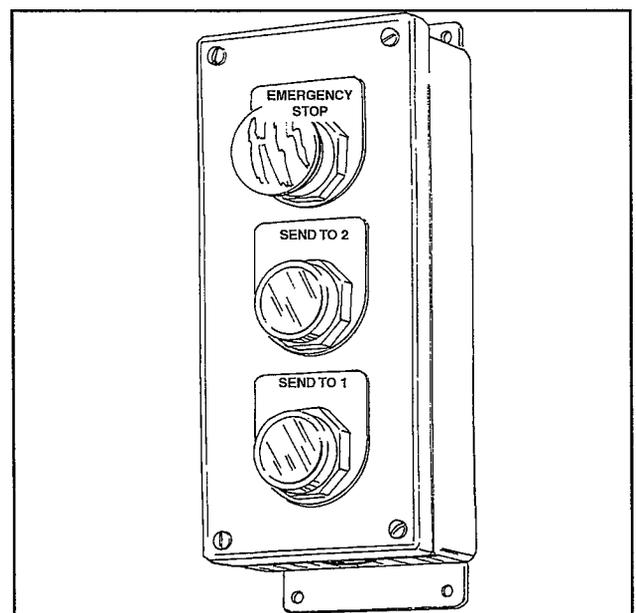


Figure 18

NOTE

Service must be performed by authorized personnel only. Read the Owner's Manual before operating the equipment. For service, contact your local representative.

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MAINTENANCE SCHEDULE

Your VRC requires consistent minimal and basic periodic attention. It is recommended that you keep a record during inspection and make a periodic evaluation of lubricating needs to reflect any increase in service that may be required. Problems must be addressed immediately as they may affect the safety devices.

AVG. NO. OF MONTHS	ITEM	ACTION	REFERENCE
3	Drive & Tensioner Chains	Coat with oil; inspect for wear, rust, bent or binding links.	Note #1*
6	Pillow Block Bearings	Grease through fitting; tighten set screws.	Note #2*
6	Chain Tensioners (Lower)	Inspect for tensioner chain and sprocket wear; adjust switch and tensioner, if required.	
12	Wheelblock Wheels	Inspect for wear. Wheels have sealed bearings. Remove and grease if any sign of contamination is present.	Note #2*
3	Guide Rollers	Inspect for wear and rotation interference.	
6	Safety Cams	Inspect for wear or damage.	
6	Chain Sprockets	Inspect for wear; tighten set screws. Center chain in chain tube.	
6	Brake	Check air gap.	
24	Reducer	Change oil.	
3	Interlocks	Inspect for proper operation.	
3	Gates	Inspect for wear and damage.	
6	Geared Couplings (By Application)	Check alignment; check bolt tightening torque; inspect seal ring and gaskets; lubricate with EP #0 grease.	

Follow above schedule. *Extreme temperatures, outdoor locations, corrosive environments, and/or contaminated environments will require more frequent maintenance and possibly different lubricants. (Check with your lubrication supplier for your particular needs.) Additional options, as ordered by the customer, may require maintenance and are not included in the above information.

*Note #1 - Use non-detergent, petroleum-based SAE 30 oil.

*Note #2 - Use lithium axle grease.

If you have any questions or problems, please feel free to contact either your local service representative or Pflow's Product Support Department for assistance.

Notes

SEW EURODRIVE GEARMOTOR INFORMATION



15870-0003

THIS DOCUMENT IS NOT A REPLACEMENT FOR THE SEW EURODRIVE "OPERATING INSTRUCTIONS". ALWAYS REFER TO THE SEW "OPERATING INSTRUCTIONS" FOR SAFETY AND INSTALLATION INFORMATION. ADDITIONAL RESOURCES AND INFORMATION FOR THE MOTOR AND BRAKE TYPE CAN BE FOUND AT THE WWW.SEWEURODRIVE.COM UNDER THE TECHNICAL NOTES TAB.

Typically SEW EURODRIVE gearmotors are designed and manufactured with totally enclosed, fan-cooled, squirrel-cage induction motors which are designed for operation under difficult conditions (Verify your gearmotor type). The windings are protected with a special insulating material, Class B or better. The brake motors incorporate a DC disc brake, and the supply is taken from a half-wave rectifier mounted inside the motor terminal box and an SR relay (when provided) mounted on the motor terminal box which switches DC power on and off.

The voltage to the brake must be applied and removed at the same time as the power to the motor.

1. Voltage to the rectifier energizes the brake coil and releases the brake.
2. Removal of the voltage to the rectifier de-energizes the brake coil and allows the brake to be applied.
3. The SR relay (when provided) switches the DC voltage to the brake coil, shortening the brake response time.
4. The AC voltage to the brake will be rectified to a DC level of 50% of the AC voltage supplied.

MAINTENANCE

The only maintenance normally required is to ensure the area between the cooling fins and the area through which the air is drawn in the fan guard is kept clean, the brake disc air gap is checked and that an audible check is made on the bearings. If the motor is being overhauled, the bearings must be cleaned and repacked. If the motor has to operate in moist or wet surroundings, then it is very important that upon reassembly of the motor, the end shield tenons are coated with a sealing compound such as Loctite.

WARNING



Dangerous high voltage potential exists. Use extreme care when testing.

WARNING

Do not work on this power unit without the platform secured or blocked in place.

If you need assistance, please call PFlow Industries, Inc. Product Support Department.

PFlow Industries, Inc. • 6720 N. Teutonia Avenue • Milwaukee, WI. 53209
Phone - Main Switchboard: (414) 352-9000 • Product Support Dept: Fax - (414) 247-9834
email: psd@pflow.com



15870-0001

NOTICE

Only a qualified controls electrician should work on the lift's electrical circuits and within the main control panel.
ALL INSTRUCTIONS THAT INVOLVE ELECTRICAL WORK APPLY TO THE ELECTRICIAN!

SEW EURODRIVE GEARMOTOR INFORMATION

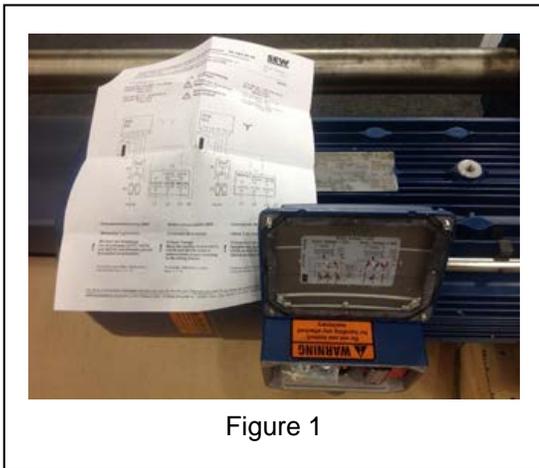


Figure 1

Verify your specific SEW Eurodrive electrical connection diagram by locating the "Circuit Diagram" sheet located in the motor junction box. A specific motor connection diagram label is fixed on the inside of the motor junction box cover. **See Figure 1**

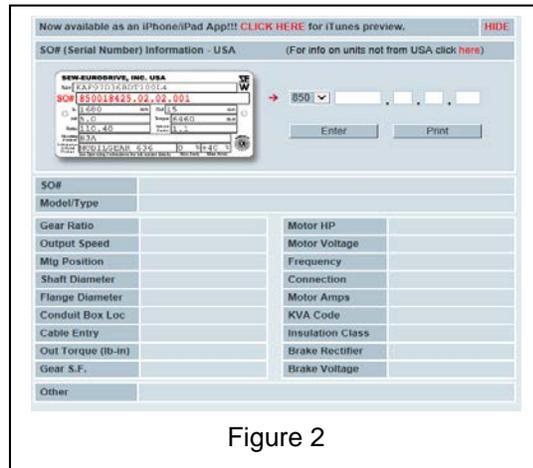


Figure 2

With the SEW Eurodrive SO# (on motor nameplate) the SEW website will indicate the gearmotor information.

The QR code (15870-0005) links to the SEW Eurodrive SO# lookup page.



15870-0005

http://www.seweurodrive.com/s_ptpilot/so_information.php5

NOTICE

For SEW Eurodrive brake only!

See the manufacturer's "Brake Service and Maintenance" information prior to working on the brake.



15870-0006

http://www.seweurodrive.com/s_admin/inc.training/files/Brake_Service_and_Maintenance.pdf

SEW EURODRIVE BRAKE OPERATION - RESOURCE



15870-0003

SEW EURODRIVE gearmotors are designed and manufactured with totally enclosed, fan-cooled, squirrel-cage induction motors which are designed for operation under difficult conditions. The windings are protected with a special insulating material, Class B or better. The brake motors incorporate a DC disc brake, and the supply is taken from a half-wave rectifier mounted inside the motor terminal box and an SR relay (when provided) mounted on the motor terminal box which switches DC power on and off.

The voltage to the brake must be applied and removed at the same time as the power to the motor.

1. Voltage to the rectifier energizes the brake coil and releases the brake.
2. Removal of the voltage to the rectifier de-energizes the brake coil and allows the brake to be applied.
3. The SR relay (when provided) switches the DC voltage to the brake coil, shortening the brake response time.
4. The AC voltage to the brake will be rectified to a DC level of 50% of the AC voltage supplied.

MAINTENANCE

The only maintenance normally required is to ensure the area between the cooling fins and the area through which the air is drawn in the fan guard is kept clean, the brake disc air gap is checked and that an audible check is made on the bearings. If the motor is being overhauled, the bearings must be cleaned and repacked. If the motor has to operate in moist or wet surroundings, then it is very important that upon reassembly of the motor, the end shield tenons are coated with a sealing compound such as Loctite.

WARNING



Dangerous high voltage potential exists. Use extreme care when testing.

WARNING

Do not work on this power unit without the platform secured or blocked in place.

NOTICE

Only a qualified controls electrician should work on the lift's electrical circuits and within the main control panel.

ALL INSTRUCTIONS THAT INVOLVE ELECTRICAL WORK APPLY TO THE ELECTRICIAN!

BMG BRAKE SYSTEM OPERATION

The BMG brake with a SR relay (when provided) is based on the fail-safe circuit principle. **See Figure 2.** The brake is released when the power is applied to the brake coil, and a spring applies the brake when power is removed. In case of a power failure, the brake still holds.

The brake coil consists of two coils. One coil is called the accelerator coil and the other is called the partial coil. When power is applied, the accelerator coil is energized, releasing the brake quickly. Shortly thereafter, the partial coil is switched on electronically (done internally by rectifier module) and placed in series with the accelerator coil. Both coils in series are used for holding. The two coils together use less power for holding; when power is removed from the brake, reaction time is shortened. To further increase braking speed and to eliminate wiring needed from the control panel to the brake, a SR relay is used. Units without a SR relay (motor junction box on the motor does not have the SR relay extending out the of the motor junction box side) must have the brake circuit wired from the control panel to the motor junction box.

DR MOTOR BRAKE SR RELAY CONNECTION DIAGRAMS

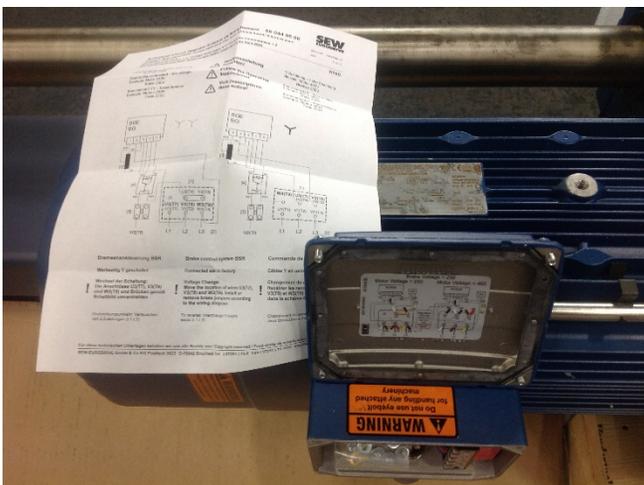


Figure 1

Verify your specific SEW Eurodrive connection diagram by locating the "Circuit Diagram" sheet located in the motor junction box. A specific motor connection diagram label is fixed on the inside of the motor junction box cover. **See Figure 1**

Now available as an iPhone/iPad App!!! [CLICK HERE](#) for iTunes preview. HIDE

SO# (Serial Number) Information - USA (For info on units not from USA click [here](#))

SEW-EURODRIVE, INC. USA

Part# KAF97D36BDT100L4

SO# **850018425.02.02.001** → 850

L 660 S 660 L 640 S 640
 L 630 S 630 L 620 S 620
 L 610 S 610 L 600 S 600

10.40 10.40 10.40 10.40
 10.40 10.40 10.40 10.40

B3A B3A B3A B3A
 B3A B3A B3A B3A

636 636 636 636
 636 636 636 636

Enter Print

SO#	Model/Type
Gear Ratio	Motor HP
Output Speed	Motor Voltage
Mtg Position	Frequency
Shaft Diameter	Connection
Flange Diameter	Motor Amps
Conduit Box Loc	KVA Code
Cable Entry	Insulation Class
Out Torque (lb-in)	Brake Rectifier
Gear S.F.	Brake Voltage
Other	

With the SEW Eurodrive SO# (on motor nameplate) the SEW website will indicate the connection diagram number (i.e. connection R72B)



The QR code (15870-0005) links to the SEW Eurodrive SO# lookup page.

15870-0005

http://www.seweurodrive.com/s_ptipilot/so_information.php5

If you need assistance, please call PFlow Industries, Inc. Product Support Department.

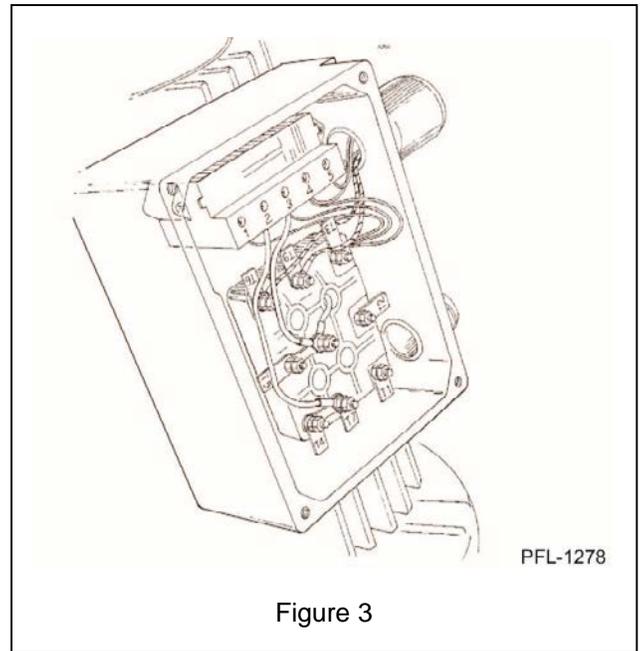
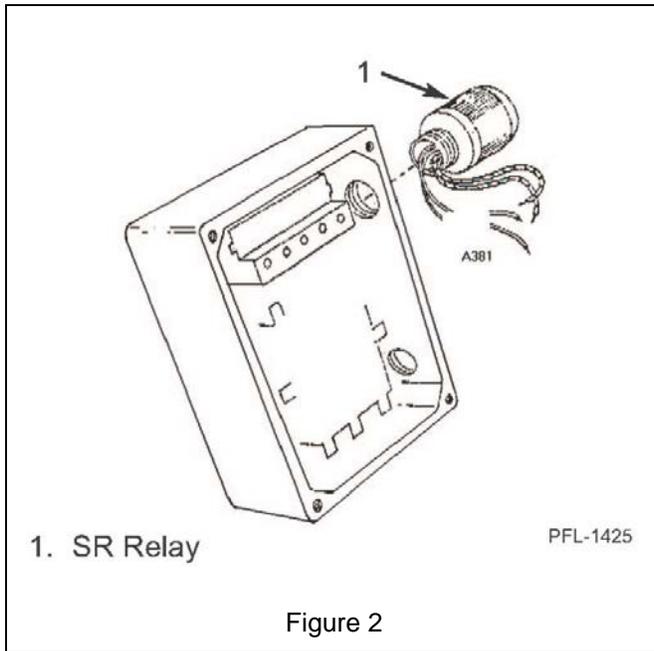


15870-0001

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 Phone - Main Switchboard: (414) 352-9000 • Product Support Dept: Fax - (414) 247-9834; email: psd@pflow.com

SR RELAY WIRING (WHEN USED)

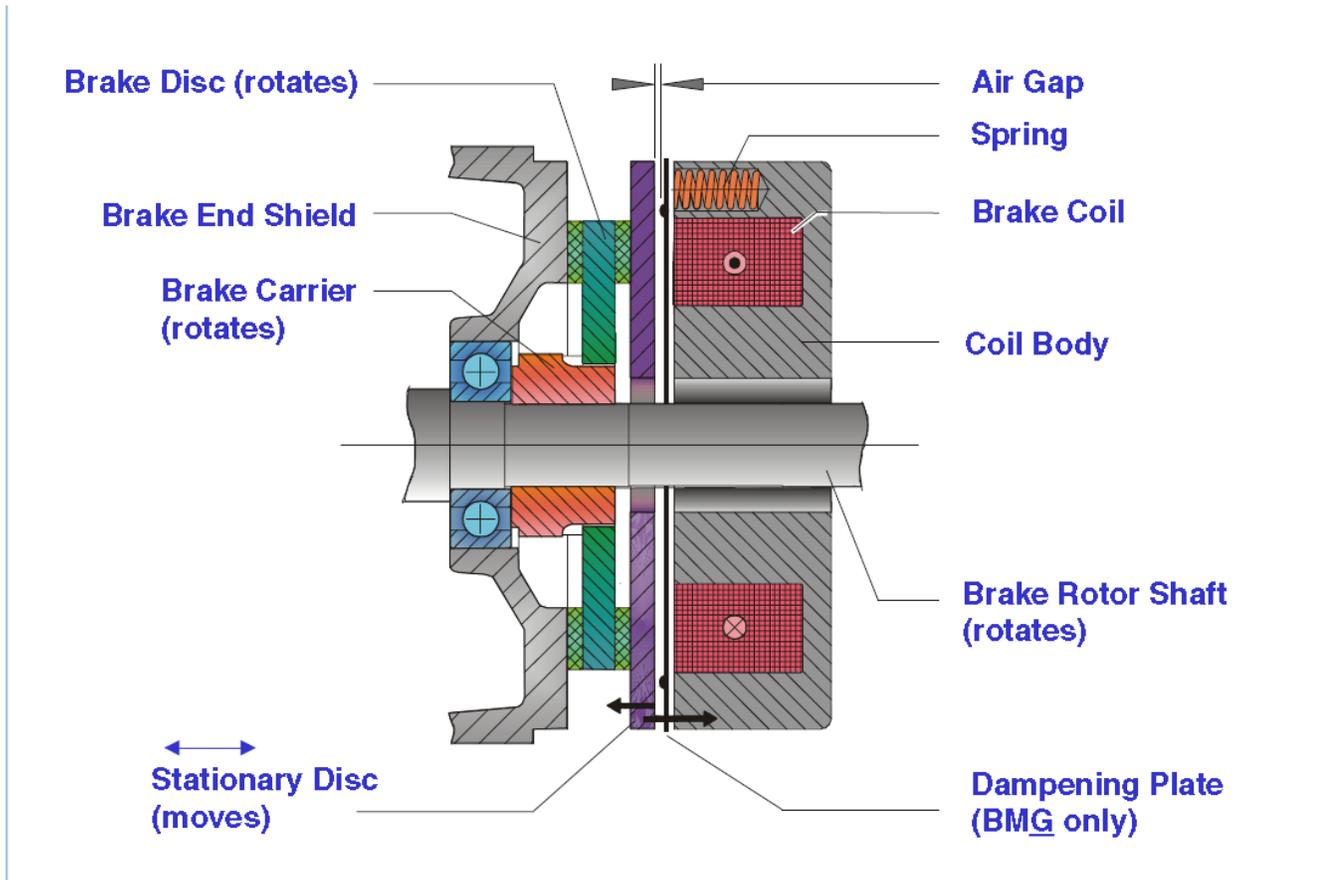
BSR control: combination of the BG or BGE rectifier and the SR relay. Used for fast brake action without additional customer supplied wiring or contacts.



TROUBLESHOOTING

Fault	Cause	Solution
1. Brake does not disengage.	<ol style="list-style-type: none"> Wrong voltage on the rectifier module. Rectifier has failed. The maximum permissible air gap due to brake line wear. Voltage drop in the high voltage connection. 	<ol style="list-style-type: none"> Apply correct voltage (check the motor/brake nameplate). Replace rectifier. Readjust brake. If brake lining is completely worn out, replace the disc brake. Ensure correct line voltage.
2. Motor does not brake.	<ol style="list-style-type: none"> Brake lining is completely worn. The air gap has increased to a point where the adjusting nuts are run up tight. The hand brake is not properly adjusted. 	<ol style="list-style-type: none"> Replace brake disc. Reset brake. The adjusting nuts must be properly adjusted.
3. Braking action is too slow.	<ol style="list-style-type: none"> The brake is actuated with the normal brake action circuit. SR relay defective. During reassembly, the brass shims were omitted. 	<ol style="list-style-type: none"> The brake is to be actuated with fast brake action circuit. Replace the SR relay. Install the brass shims.

BRAKE COMPONENTS



NOTICE

For SEW Eurodrive brake only!

See the manufacturer's "Brake Service and Maintenance" information prior to working on the brake.



15870-0006

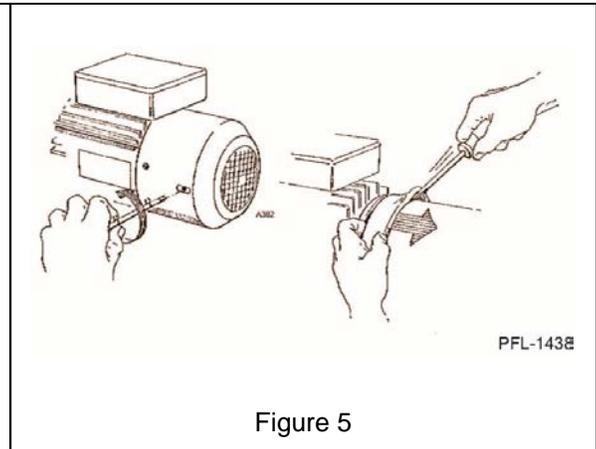
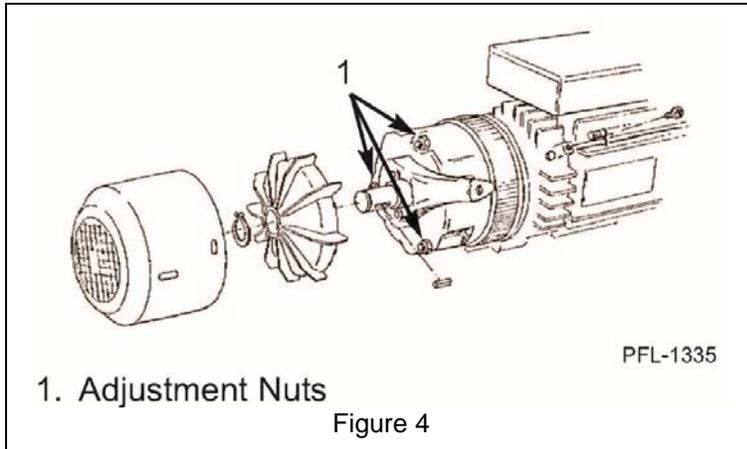
http://www.seweurodrive.com/s_admin/inc.training/files/Brake_Service_and_Maintenance.pdf

ADJUSTING BRAKE AIR GAP

NOTICE

Air gap is factory set. Adjust only after consulting factory.

1. Remove cover and fan.
2. Tighten the three brake adjustment nuts lightly. **See Figure 4 & 5.**

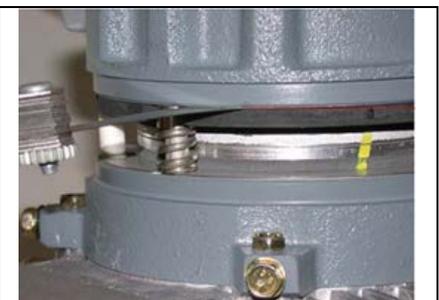


CAUTION

Do not over tighten nuts!

3. Slide rubber seal over so the stationary disc and brass shim are exposed.
4. Back off the three brake adjustment nuts until the correct brake working air gap is obtained between shim and stationary disc. **See Table 1** for correct air gap. **See Figure 6 & 7.**
5. Any adjustment to the air gap will also affect the play in the manual release.
6. Since the stationary disc will move away from the coil body during the brake's operation, it is vital that there is free play (floating clearance) on the release arm of 0.060"-0.080" (1.5-2.0 mm). The springs should be placed between the arm and the nuts to eliminate noise.

Motor Size	Brake Size	Air Gap
DT71 - DT100	BM(G)05 - BM(G)4	0.010"-0.024" (0.25-0.6 mm)
DV112 - DV225	BM(G)8 - BM31	0.012"-0.047" (0.3-1.2 mm)
DV180 - DV225	BM32-BM62 Double Disc	0.016"-0.047" (0.4-1.2 mm)
DV250 - DV280	BMG61	0.012"-0.047" (0.3mm - 1.2mm)
	BMG122 Double Disk	0.016"-0.047" (0.4mm-1.2mm)
Table 1		

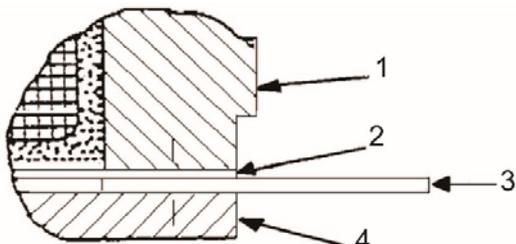


NOTICE

**Adjustments to the air-gap must be made evenly.
Adjust each nut and recheck adjustment once the final gap has been set.**

NOTICE

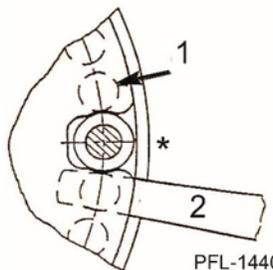
**There must always be clearance on the release arm lever.
The brake release mechanism is not used to change the brake's torque setting.**



- 1. Coil Body
- 2. Damping Plate
- 3. Feeler Gauge
- 4. Stationary Disc

PFL-1445

Figure 6



- 1. Damping Plate Button
- 2. Feeler Gauge

NOTE

**Be sure air gap is measured directly under the damping plate button.*

PFL-1440

Figure 7

BRAKE DISC INSPECTION

- 1. Remove cover and fan.
- 2. Slide rubber seal back to expose brake disc. **See Figure 4 & 5.**

HAND RELEASE MECHANISM

Most of the brakes are supplied with a hand operated release lever allowing the operator to open the brake without applying power to make adjustments on the driven machinery.

The “BMHR” 4-type requires a lever to be inserted into the release arm. To open the brake, pull the lever away from the motor. Brake will re-engage automatically when the lever is released. The lever, when not used, is attached to the motor’s cooling fins with clamps.

Since the stationary disc will move away from the coil body during the brake’s operation, it is vital that there is free play (floating clearance) on the release arm of 0.060” – 0.080”. The springs should be placed between the arm and the nuts to eliminate noise.

NOTICE

The brake release mechanism is not used to change the brake’s torque setting. There must always be clearance on the lever.

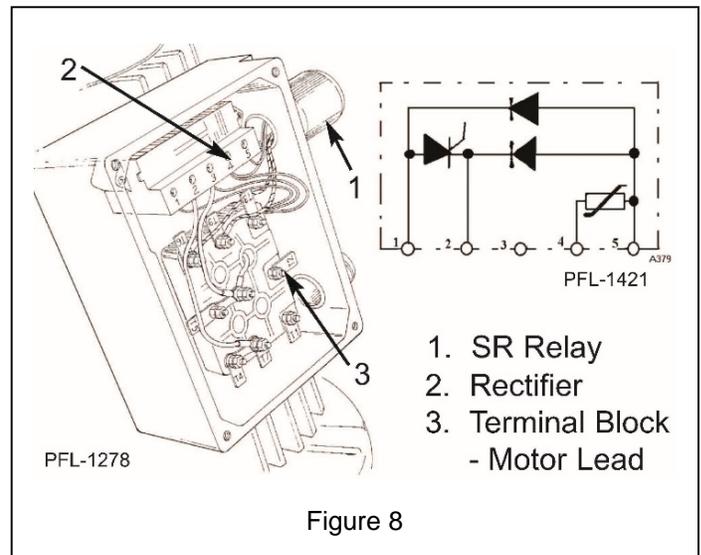
TESTING BRAKE RECTIFIER

WARNING

To prevent electrical shock, be sure to disconnect the power to the brake circuit before attempting to service or repair.

The BGE rectifier module, due to its internal construction, cannot be checked thoroughly with an ohmmeter. You can only check to see if any internal parts are damaged to an open state, which would show an infinity reading on the meter.

1. Identify as BGE style (red cover).
2. Remove all wires from the terminal strip of the rectifier.
3. Set meter range to K Ω .
4. Check for opens between all terminals. An extremely low resistance reading may indicate a defective rectifier.
5. To isolate the brake problem to the rectifier module as potentially defective, it may be necessary to replace or check voltages on the rectifier to see if it is functioning properly.



CAUTION

Before replacing the rectifier module, determine the cause of the failure to prevent damage to the replacement module.

Notes

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F Series

Eurodrive Reducer Information

WARNING

Check oil level prior to operation!

NOTE

Make sure that the plastic stop in the vent plug is removed before operating the gear unit. This will ensure that no pressure buildup will take place inside the gear unit.

OIL LEVEL

To check the oil level, remove the red painted screw plug. The level is correct when the surface of the oil is level with the lowest point of the tapped hole.

LUBRICATION

Each gear unit is supplied from the factory with the correct grade and quantity of lubricant for the specified mounting position

Gear Units	Type	Manufacturer	Ambient Temperature (C)
F..37-127	Mobilgear 629(M)	Mobil Oil Co.	-15 to +25
F..37-127	Mobil SHC 630(S)	Mobil Oil Co.	-25 to +60
F..37-127	Mobil SHC 629(S)	Mobil Oil Co.	-30 to +50

(M) Mineral Oil

(S) Synthetic Oil

Gear Unit	Mounting Position (H3)
F..37	0.29/1.1
F..47	0.45/1.7
F..67	0.85/3.2
F..77	1.66/6.3
F..87	2.96/11.2
F..97	5.42/20.5
F..107	7.40/28
F..127	12.94/49

The approximate lubricant in US gallons/liters per mounting position.

MAINTENANCE

1. All oil levels and oil quality must be checked every 5,000 hours of operation. If the oil is contaminated, burned, or waxed, change the oil immediately and flush out the box if necessary.
2. Under normal operating conditions, change oil every 10,000 hours of operation or two years.
3. When synthetic oil is used, change the oil every 40,000 hours or four years.

The above suggestions are subject to change if the units are running in high temperature, high humidity, or corrosive environments.

STORAGE

Units must be stored in the normal position. Units in storage or operated very intermittently must be run briefly at least once a month to protect the gears and seals by circulating the lubrication. For long-term storage, units should be completely filled with oil containing a rust preventative which is soluble in lubricating oil or drained of oil and cleaned with a rust preventative applied to the shaft, gears, and bearings. When taken out of storage for use, the gear unit must be cleaned out and refilled with the proper oil.

SAFETY CAM INSPECTION



The safety cam is a lift safety device.

Follow all site energy lockout procedures before beginning any work on this component.

Prior to starting any safety cam inspection or removal you must thoroughly understand it's operation. Contact PFlow Industries, Inc. service department with any questions or concerns.



Inspect and maintain this safety device to ensure it's proper operation.

Routine inspection of the safety cams is EXTERMELY important since they are one of the major safety components of this PFlow Industries, Inc. product.

Fully read this section prior to safety cam inspection.

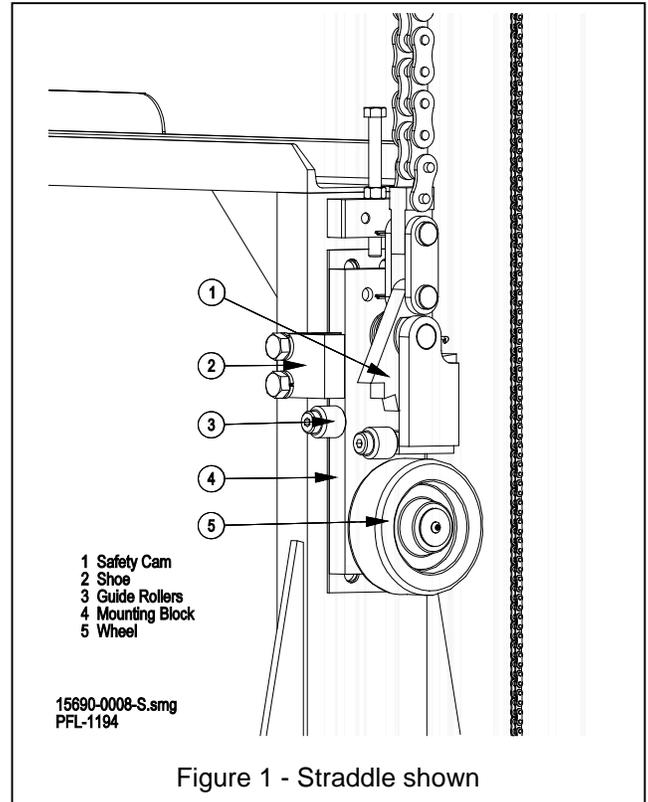
VISUAL INSPECTION ONLY

1. VISUAL INSPECTION

Routinely visually checked the safety cam for rust and corrosion, chipped or broken safety cam teeth and any other visual signs of wear or damage.

2. SAFETY CAM ROTATION

The safety cam must rotate freely to preform properly. Check for cam rotation by bringing the carriage down to the lowest level and slackening the lift chain. If necessary contact PFlow Industries, Inc. service department for assistance.



WHEELBLOCK REMOVAL FOR INSPECTION - AS REQUIRED

This inspection is recommended in the event that the lift carriage experienced an extreme impact overload or the safety cams set during normal lift operation.

 **CAUTION**

Since the chain tensioner and lower level limit switches will be disconnected in this procedure, it is possible to run the lift chains off the upper sprockets. If this is done the lift chain will fall down.

Locate and be familiar with the emergency stop button for the lift.

FOR THIS PROCEDURE YOU WILL BE REQUIRED AND MUST MANUALLY SHUT OFF (STOP) THE UNIT WITH EMERGENCY STOP BUTTON.

Understand site energy lockout to work on the unit.

1. To remove the wheelblocks for inspection, for ease of re-assembly, visually check the lowest level limit switch arm position. Note its orientation on the switch body. Later in the procedure this arm may be removed from the limit switch.

 **DANGER**

When locking out the electrical power follow the site lockout/tagout procedure.

 **WARNING**

Only an authorized electrician should perform any of the necessary electrical procedures that follow.

2. Sent the carriage at the lowest level and SECURE THE CARRIAGE.
3. Lock out the electrical power per the site lockout/tagout procedure.

 **WARNING**

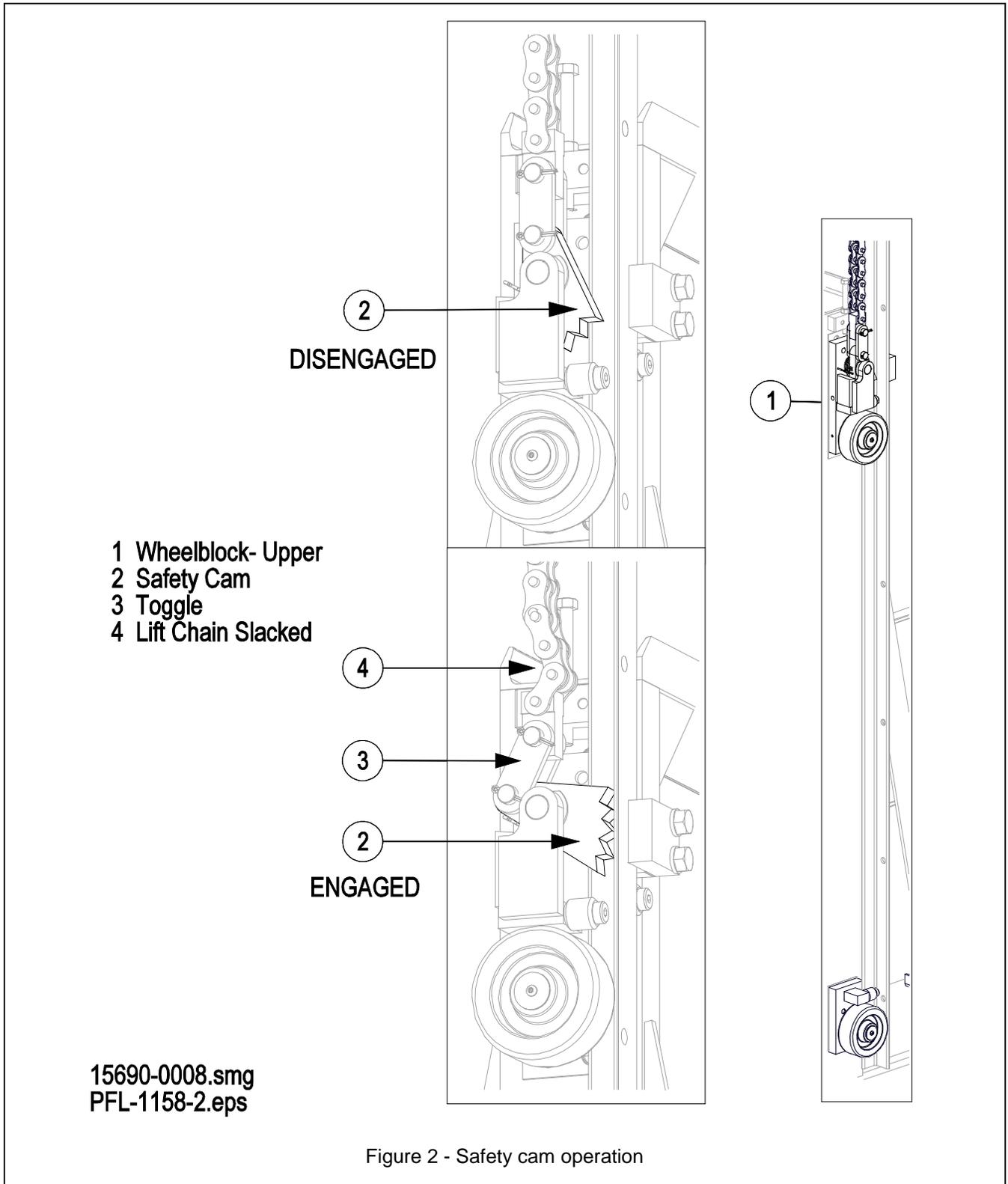
Keep all site personnel informed that this inspection process is underway. Lockout/tagout all control devices (i.e. upper level push button stations, PLC, etc.). During this process limit switches are temporarily out of service. At times the control of the lift carriage is by the use of the emergency stop button only.

4. The chain tension chain may still be under a spring tension load. Remove the spring load by rotating turnbuckle to remove the remaining spring tension on the chain tensioner springs. Remove the #35 chain (typical chain tensioner chain) from the attachment point on carriage or wheelblock. Remove it from the chain tensioner sprocket. Lay it aside so it will not be damaged or contaminated.
5. Loosen, remove, or carefully twist the chain tensioner limit switch arm (rod) out of way of the two roll pins on the chain tensioner so the arm goes back to the neutral position.
6. If necessary loosen and remove floor level limit switch arm.
7. Locate and be prepared to use the emergency stop button to stop the carriage. Carefully turn on the power. Push the "Call to Lower Level" button. When the carriage rests on lower level floor, **hit the emergency stop button** immediately so the lift chains are slightly slack. **See Figure 2.**
8. Remove the wheelblock jackscrews, **Figure 6.** Don't loosen the adjustable bolt nut. It will help to re-install the wheelblock in the original location.
9. Remove the bolts holding wheelblocks to the carriage uprights (if the unit has the crushable aluminum safety block option, this also is to be removed.)
10. Remove the wheelblock shoes and the wheelblock outside guide roller, **Figure 1.**
11. Locate and be prepared to use the emergency stop button to stop the carriage. Now you can raise the wheelblocks by lifting up on lift chains and twisting wheelblock out of columns. Since the limit switches are inactive because the arms are removed, **you must push the emergency stop button to stop and turn the lift off** if you turn power on to lift the wheelblock up. Carefully push the upper level button and raise the wheelblocks to clear the carriage uprights and header. **You must push the emergency stop button to stop and turn the lift off.** Again, twist wheelblocks out of column.
12. Look for wear on the wheelblock components. Check that safety cam rotates freely when weight is taken off of the lift chains.
13. If everything checks out, re-install the upper wheelblocks back into the columns so the mounting holes line up with slots in carriage uprights. (Weight of the wheelblock should keep safety cam engaged. If it catches, you might have to lift up on chain to disengage the safety cam and lower it into position.)
14. Re-install the outer guide roller, four mounting bolts, and wheelblock shoes (and wheelblock shoe shim if provided). Snug the bolts.
15. Re-install the jackscrew assembly back on to the carriage. If you did not move the adjustable bolt nut and have the correct assembly for that corner, you should be able to place wheelblock against the adjusting bolt and carriage should be in same position prior to removing the wheelblocks. Tighten all the wheelblock shoe bolts and wheelblock mounting bolts.
16. **You must push the emergency stop button to stop and turn the lift off.** Turn power back on and raise carriage up slightly higher than the normal floor level. Again, use caution, **you must stop unit by pushing in emergency stop button** (the limit switches are not yet set).
17. Place the #35 chain around chain tensioner sprocket and back up to mounting point on carriage.
18. Re-install the limit switch arms on chain tensioner limit switches. The correct location is when the arm is horizontal to the floor and in between roll pins on chain tensioner. Adjust with turnbuckle if needed.
19. Place the floor level limit switch arm back on floor level switch approximately in same orientation.
20. Clear any temporary support use in securing the carriage.

21. **You may need to push the emergency stop button to stop and turn the lift off.** Run the carriage up a few feet, **hit emergency stop button** and then pull out it out. Keep your hand on the emergency button; push "Call to Lower Level" button. If carriage hits ground, hit emergency stop button. Raise the carriage and readjust lower floor level limit switch. Continue to readjust the limit switches until carriage stops at the correct elevation.

NOTICE

See illustrations on next pages.



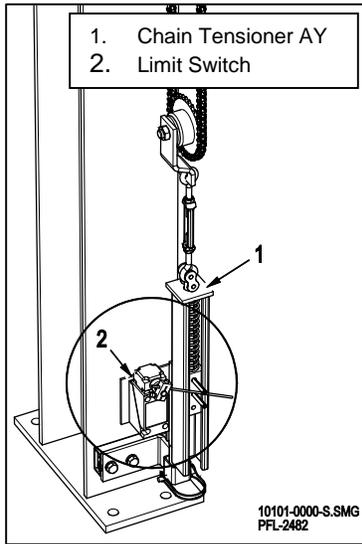


Figure 3

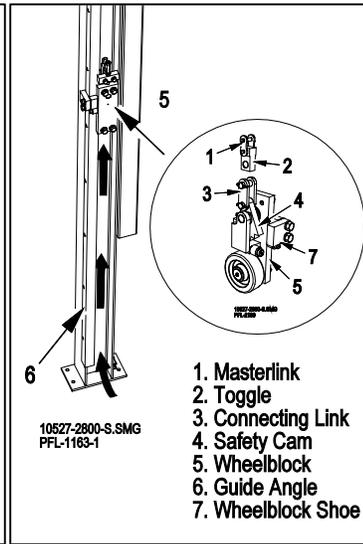


Figure 4

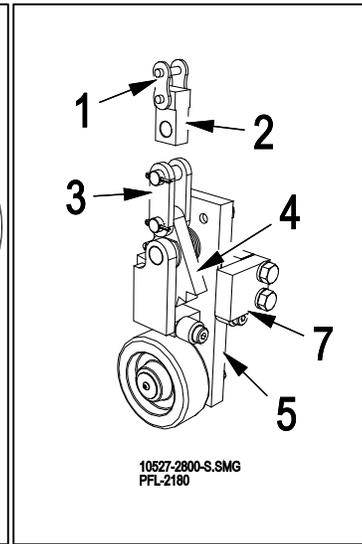


Figure 5 (straddle shown)

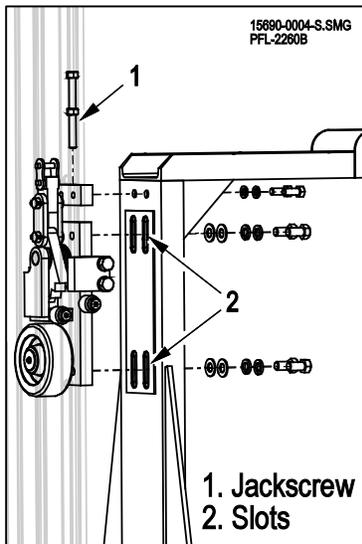


Figure 6 (straddle shown)

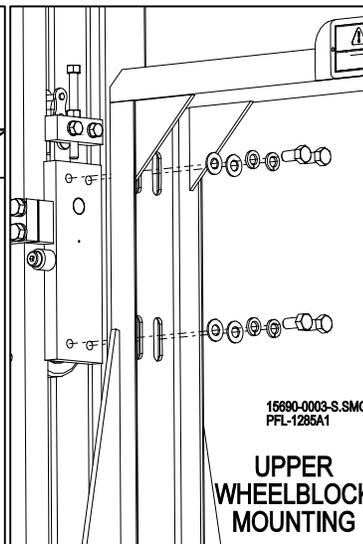


Figure 7 (straddle shown)

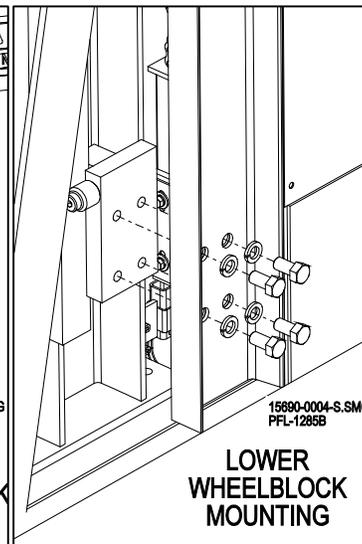


Figure 8 (straddle shown)

If you need assistance, please call PFlow Industries, Inc. Product Support Department.



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F Series

Wheelblock Orientation (Right and Left Hand)

The description for wheelblock assemblies does not indicate the right hand or left hand side of the lift as you view the lift from the lift front.

The layout of the columns, as illustrated, is for a Series F lift.

To determine the correct wheelblock assembly, stand on the carriage platform and face the column that requires the replacement wheelblock. The wheelblocks bolt to the carriage upright and the wheels ride inside the wide flange (WF).

Standing on the carriage, then facing the web of the wide flange column web: If the column guide angle is on the right, a left hand wheelblock fits up to the column. If the column guide angle is on the left, a right hand wheelblock fits up to the column. See Figure 13.

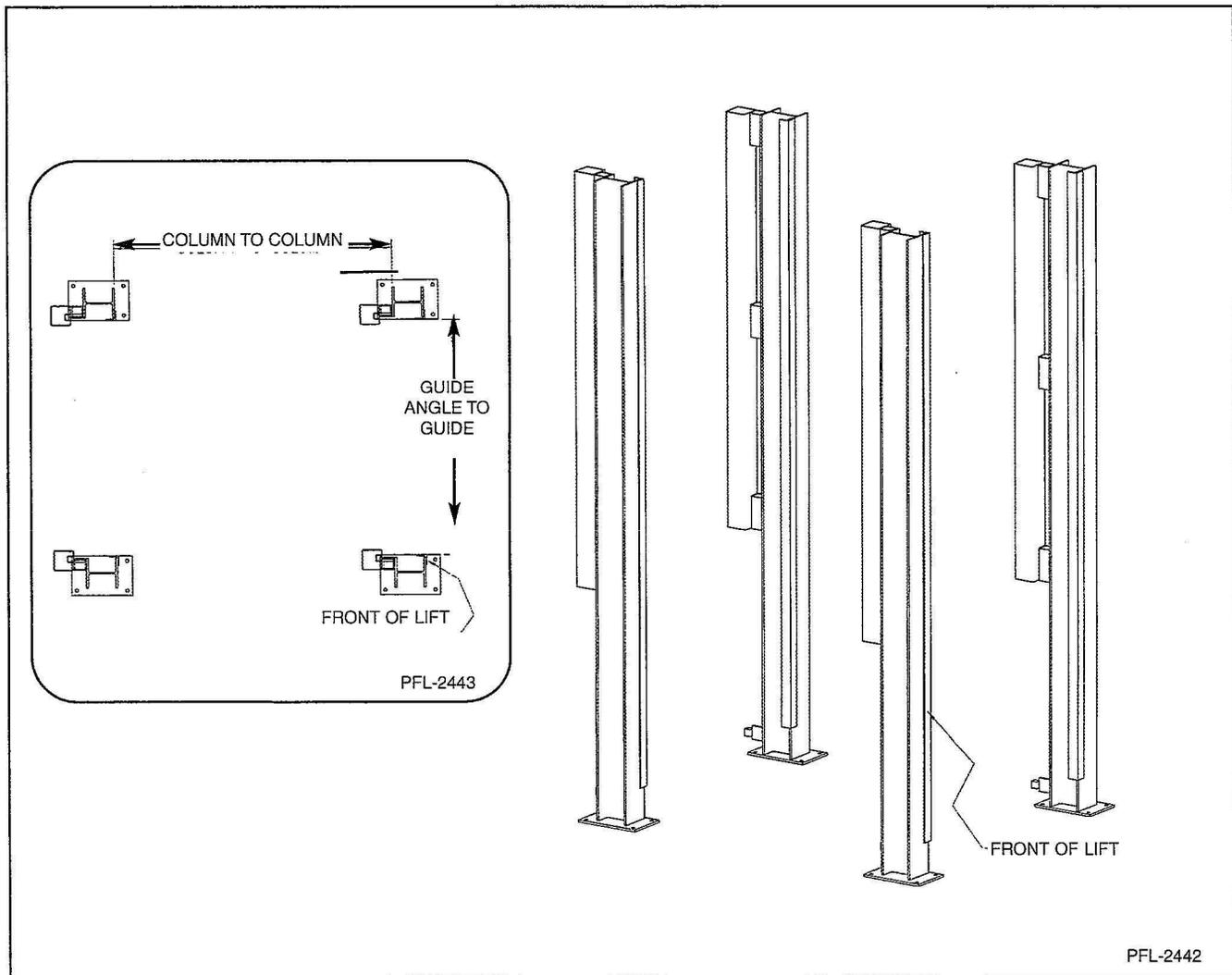


Figure 13

Troubleshooting

Before troubleshooting, please observe all of the precautions in the Safety section at the front of this manual.

The following is a list of common problems and solutions:

SYMPTOM	POSSIBLE CAUSE	SUGGESTED SOLUTION	REF.
Controls (push buttons) do NOT start motor	Gate or door is open or ajar.	Check all gates/doors to make sure they are closed.	
	Main disconnect is off.	Check to see if there is a reason before turning on.	
	Thermal overload has tripped	Press reset button. If it trips again, determine cause. The motor is overheating.	
	Control fuse is blown.	Replace fuse after determining cause.	
	Power circuit between disconnect and starter is dead	Using a voltmeter, check voltage. Repair as needed.	
	Slack lift/tensioner chain	Tighten chain	
	Broken lift/tensioner chain	Repair or replace as needed.	
Motor starts and carriage raises, but motor stops before second level	Safety gate has been opened.	Close gate. Check to see why this has happened.	
	Object encountered	Identify the problem. Remove or repair as needed.	
	Drive component interference.	Remove object. Repair if needed.	
	Jam relay or thermal overload has tripped.	Lower and remove excessive weight. Check brake for possible malfunction, excessive ambient temperature, or mechanical binding.	
	Slack lift/tensioner chain	Tighten chain.	
	Broken lift/tensioner chain.	Repair or replace as needed.	
Lift motor starts for three seconds and stops	IOL (jam) relay trips	Lighten load.	
Carriage fails to stop	Travel limit switch failure	Adjust, repair or replace.	
	Brake failure	Determine cause and correct.	

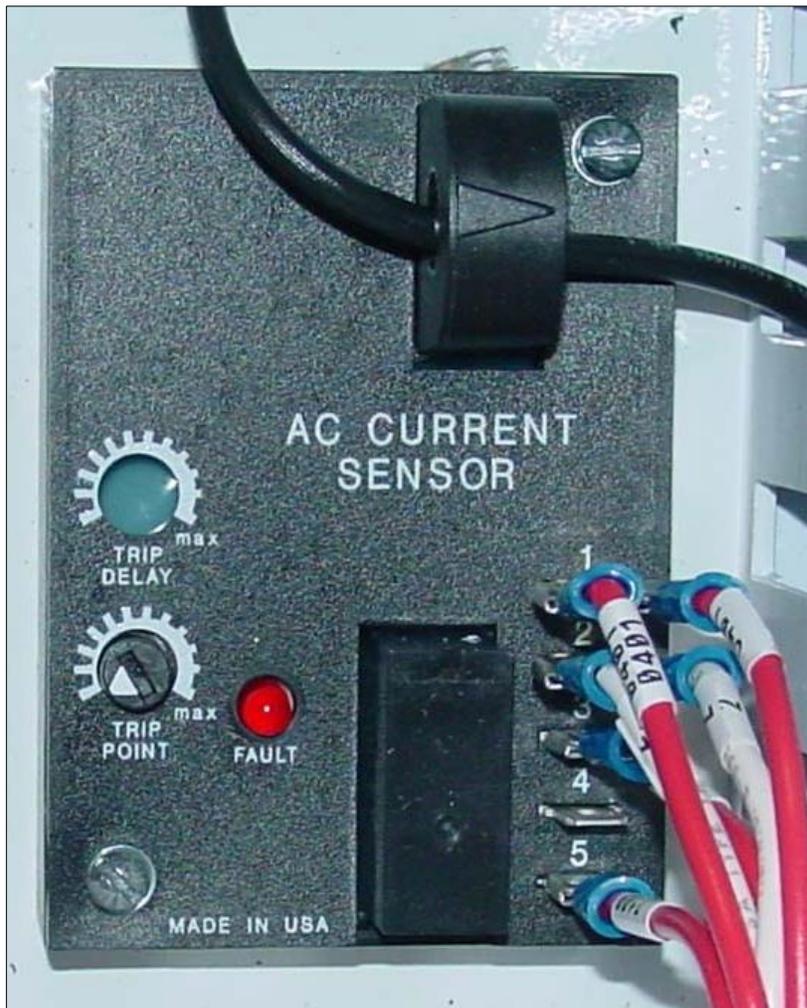
F Series

SYMPTOM	POSSIBLE CAUSE	SUGGESTED SOLUTION	REF.
Carriage raises, but it will not lower.	Mechanical interference	Identify the problem; remove and repair as needed.	
Carriage lowers but stops early.	Debris in the pit.	Clean pit out.	
Rough or noisy operation	Interference between chain and guards or guides.	Determine cause and correct.	
	Shaft or idler sprocket bearings.	Inspect, lubricate, and replace as needed.	
	Motor/reducer	Determine cause and correct.	
	Travel interference	Identify; remove or repair as needed.	
	Drive component interference	Identify; remove or repair as needed.	
	Wheel guide rollers worn.	Inspect, lubricate, and replace as needed. Determine why they wore out.	
	Slide shoe rubbing on main beams.	Determine cause and correct.	
	Carriage is not level.	Determine cause and correct.	
Motor hums but does not rotate; then thermal overload trips.	Load is greater than capacity.	Lighten load.	
	Object encountered.	Identify the problem. Remove or repair as needed.	
	Drive component interference	Remove object; repair if needed.	
	Improper operation of brake/motor or reducer.	Refer to Service section of this manual.	
	Single phasing	Using a voltmeter, check incoming main leads. Repair as needed.	

OCS OVERCURRENT SENSOR

Infield Adjustment:

1. If the current adjustment dial is calibrated, adjust it to the full-load amperage of the motor. If it is not calibrated, turn the current adjustment dial to its lowest position.
2. Place the maximum load on the carriage.
3. Run the carriage UP.
4. If the solid state IOL trips, turn the current adjustment dial clockwise a small amount and repeat step 3.
5. If the solid state IOL does not trip, run the carriage DOWN.
6. If the solid state IOL trips, turn the current adjustment dial clockwise a small amount and repeat step 5.
7. If the solid state IOL does not trip, run the carriage UP and DOWN several times.
8. If the solid state IOL trips, repeat step 3.
9. If the solid state IOL does not trip, the solid state IOL is properly adjusted.



Note: This photo is for reference only. Your actual solid state OCS may be different.

F Series

Recommended Spare Parts Listing-Series F

This recommended spare parts list is generic (not specific to your PFlow lift). Part numbers are deleted due to variables specific to each application. This list is a guide to assist the customer in establishing an emergency inventory for your PFlow VRC. Convenience and minimal down time are two good reasons to maintain an inventory of spare parts. This list does not imply that any part is subject to failure. However, should any of these parts should fail; they could put the unit out of service.

Your PFlow representative can provide a customized recommended spare parts list.

Quality	Part Number	Description	Price for Each
		<u>Lift Rollers</u>	
2		Roller, Main	\$
2		Screw, Guide Roller	\$
2		Roller, Trolley Gide	\$
		<u>Chain Tensioner Components</u>	
2		S-Hooks	\$
2		Swivel	\$
2		Turnbuckle	\$
		<u>Electrical Components</u>	
1		Button with contact, UP/DOWN	\$
1		Button with contact, E-Stop	\$
1		Timer	\$
1		Motor Circuit Protector	\$
1		Limit Switch	\$
1		Arm, Limit Switch	\$
		<u>Gate Components</u>	
1		Keeper, Interlock	\$
1		Roller, Interlock Actuator Arm	\$
1		Cable, Interlock Actuator (x Feet)	\$
2		Magnet, Swing Gate	\$
2		Contact with Insulator (Bi-Swing Gate)	\$

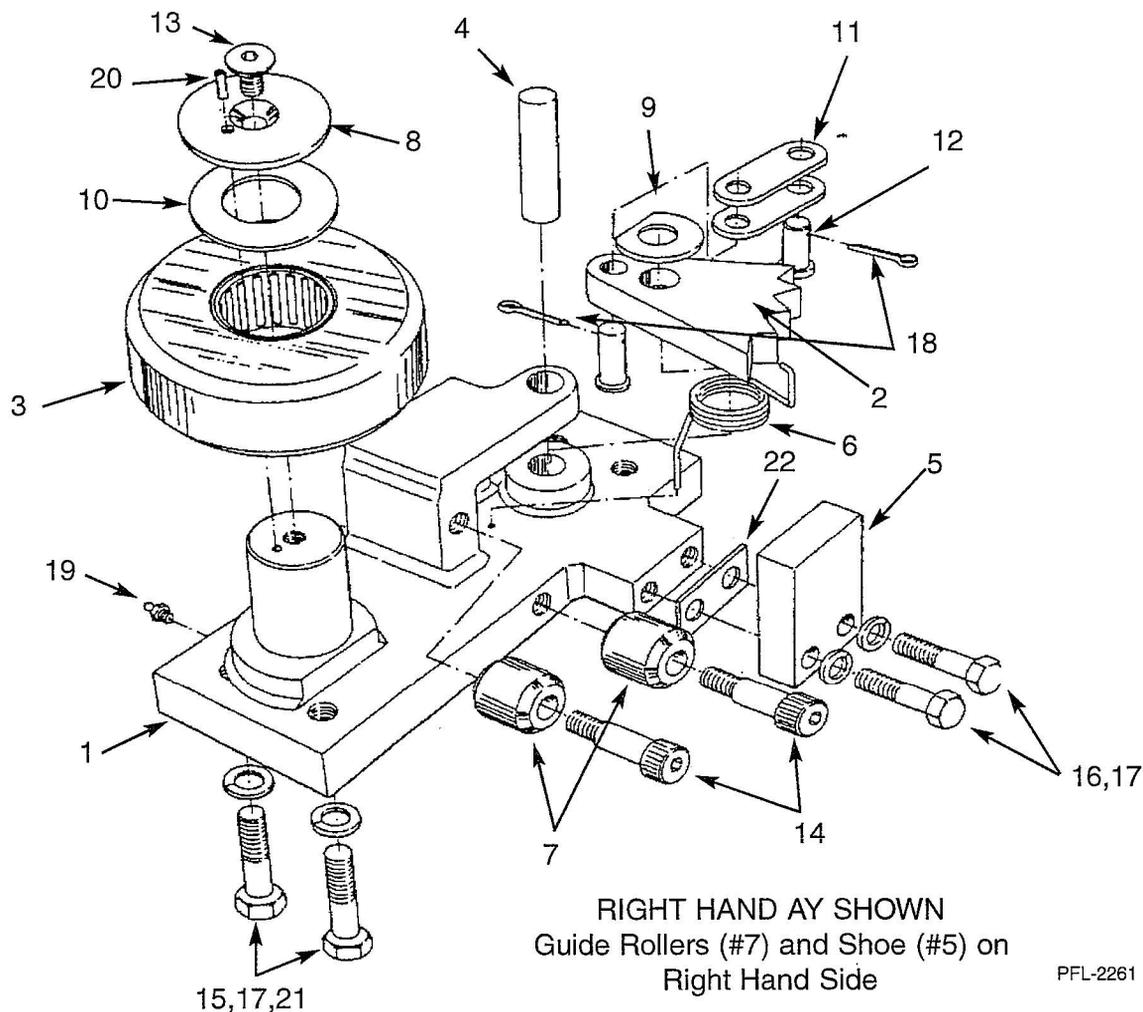
Part numbers within this manual are subject to change or correction without notice. A \$50 Rush Fee may be charged for requested same day shipments. Components replaced under warranty will be charged for in accordance with our RGA procedures. Minimum order charge is \$35. FOB Milwaukee, Wisconsin. PFlow Industries Product Support Department must issue an authorization in advance of any claim for warranty and or warranty labor. Any changes, updates, parts by others or modifications after shipment are unknown to PFlow Industries.

PFlow Industries, Inc. 6720 N. Teutonia Avenue, Milwaukee, WI. 53209
 Phone (414) 352-9000 Fax (414) 352-9002

Upper Wheelblock Assembly 5 1/4 Steel Wheel w/Roller Bearing

Complete Assembly, Part. No. 6492-0000, Left Hand

Complete Assembly, Part No. 6491-0000, Right Hand (Shown)



RIGHT HAND AS SHOWN
Guide Rollers (#7) and Shoe (#5) on
Right Hand Side

PFL-2261

Item	Qty.	Part No.	Description
1	1	5244-0000	Wheelblock Weldment, RH
		5245-0000	Wheelblock Weldment, LH
2	1	6186-0000	Cam, Safety
3	1	6381-0001	Wheel, 5 1/4 Steel w/RB
4	1	5230-0000	Pin, Cam
5	1	2754-0000	Shoe
6	1	2443-0000	Spring, Cam, RH
		2127-0000	Spring, Cam, LH
7	2	5221-0000	Roller, Guide
8	1	3629-0000	Retainer, Steel Wheel
9	1	8339-0000	Bearing Thrust
10	1	3622-0000	Washer, Thrust, 1 3/4 Whl Stud
11	2	6187-0000	Link, Safety Cam to Toggle

Item	Qty.	Part No.	Description
12	2	2521-0000	Pin, Clevis 3/4 x 2
13	1	4299-0016	Screw, FHSC, 1/2-13 x 1
14	2	5874-0020	Bolt, Shoulder, 5/8 x 1 1/4
15	4	6758-0020	Screw, HHC 5/8-11 x 1 1/4
16	2	2198-0040	Screw, HHC 5/8-11 x 2 1/4
17	6	5858-0015	Lockwasher, STD 5/8
18	2	2522-0000	Pin, Cotter
19	1	2590-0000	Fitting, Zerk
20	1	5209-0012	Pin, Roll
21	4	7768-0015	Washer, Flat, 5/8 SAE (Not Shown)
22	*	2767-0000	Spacer, Wheelblock Shoe

*Number of spacers dependent upon column size.
W6 x #15 = 0
#20 = 1
#25 = 2

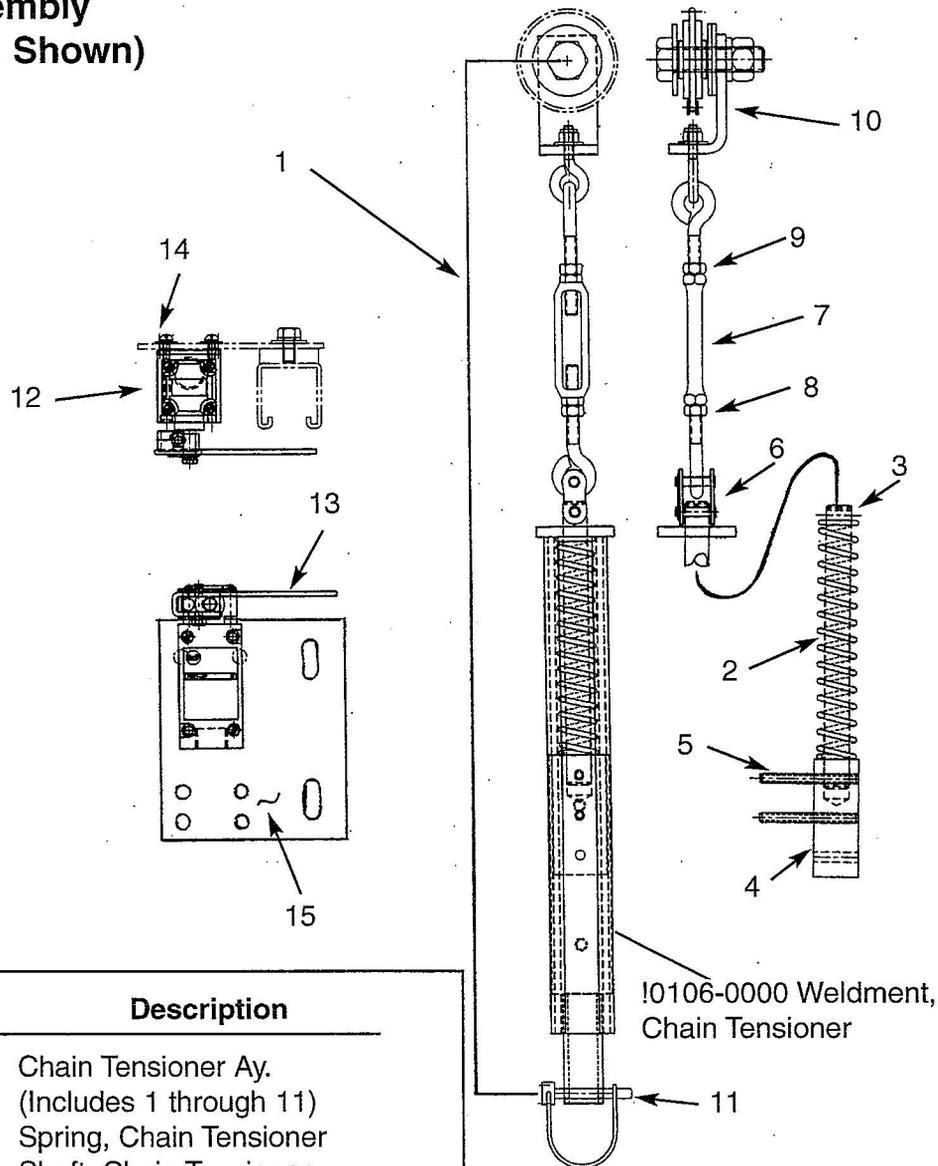
Parts

Chain Tensioner Assembly with Limit Switch (RH Shown)

P/N 10101-0XXX-D

0 - RH
1 - LH

Limit Switch
Type



Item	Qty.	Part No.	Description
1	1	10107-0000	Chain Tensioner Ay. (Includes 1 through 11)
2	1	10111-0000	Spring, Chain Tensioner
3	1	10103-0000	Shaft, Chain Tensioner
4	1	10102-0000	Guide Block, Tensioner
5	2	5854-0040	Roll Pin, 1/4" x 2-1/2"
6	1	5667-1001	Link, #60
7	1	2520-0000	Turnbuckle, 5/16 x 2 3/4 x 6 1/2
8	1	3732-0010	Nut, 5/16-18, LH Thread
9	1	6358-0010	Nut, 5/16-18, RH Thread
10	1	10244-0000	Sprocket & Bracket Ay.
11	1	10184-0024	Pin, Lynch 1/4 x 1 1/2
12	1	**	Limit Switch
13	1	**	Arm, Adjustable Rod Limit Switch
14	2	**	Bolt, Limit Switch Mtg.
	2	**	Lockwasher, Switch Mtg.
	2	**	Washer, Switch Mtg.
15	1	10182-0000	Bracket, Switch Mtg.

#15 - Mounting Hardware (Not Shown)	
2	6846-0010 Screw, HHC, 5/16-18 x 5/8
2	5858-0010 Lockwasher, Std 5/16
2	6296-0010 Washer, Flat, Std 5/16

**Contact Pflow Industries for part number. Lift serial number required to determine limit switch type.

PFL-2114

Chain Loop Arrangement

The following drawings depict the path of the lift chain (#3).

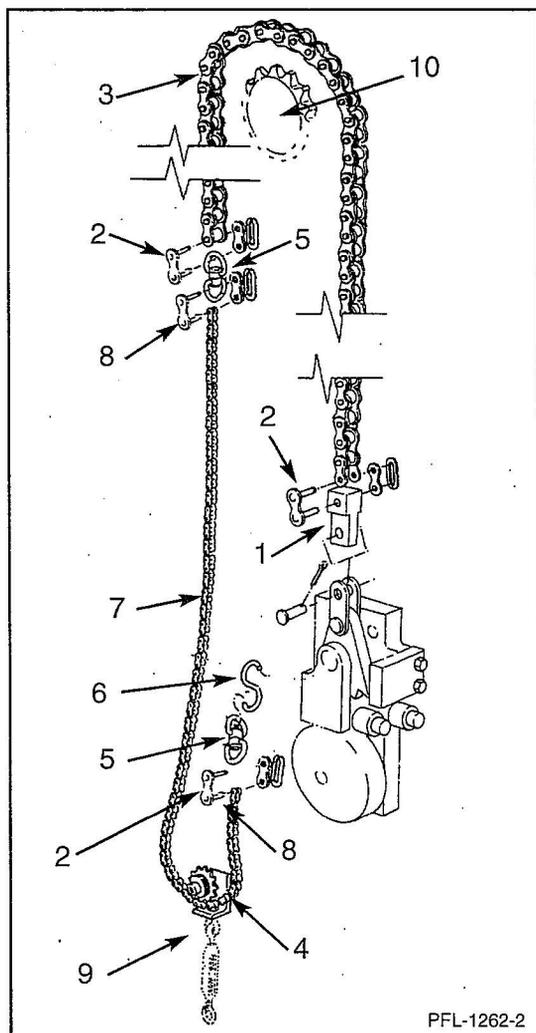
The drive chain (not shown) is applicable to the F-Series only and runs between the sprockets on the top of the unit.

The tensioner chain (#7) is the section that connects the wheelblock/standoff to the lift chain (#3).

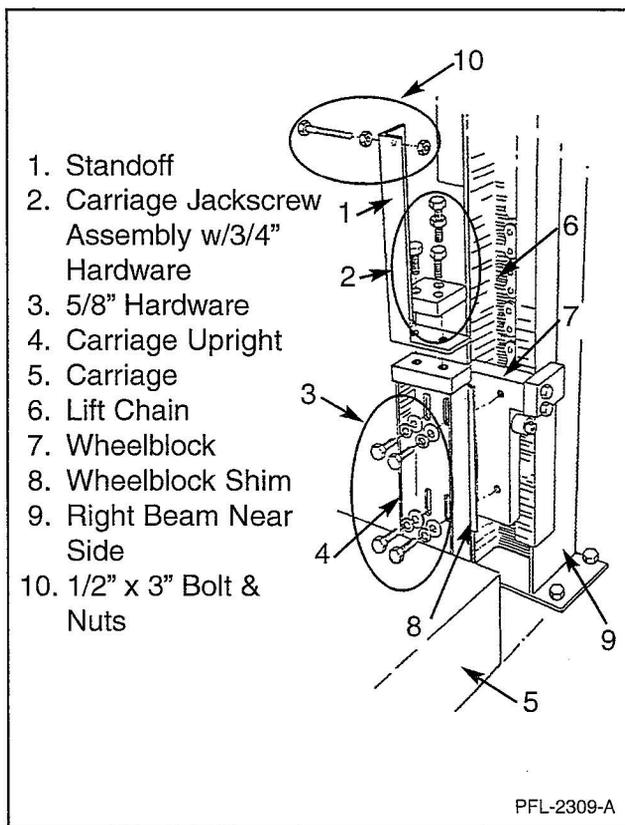
NOTE

Size of drive and lift chain vary by application. Consult factory before ordering.

Exploded views of the wheelblock and chain tensioner assemblies can be found on other pages within this manual. See your Table of Contents.



PFL-1262-2



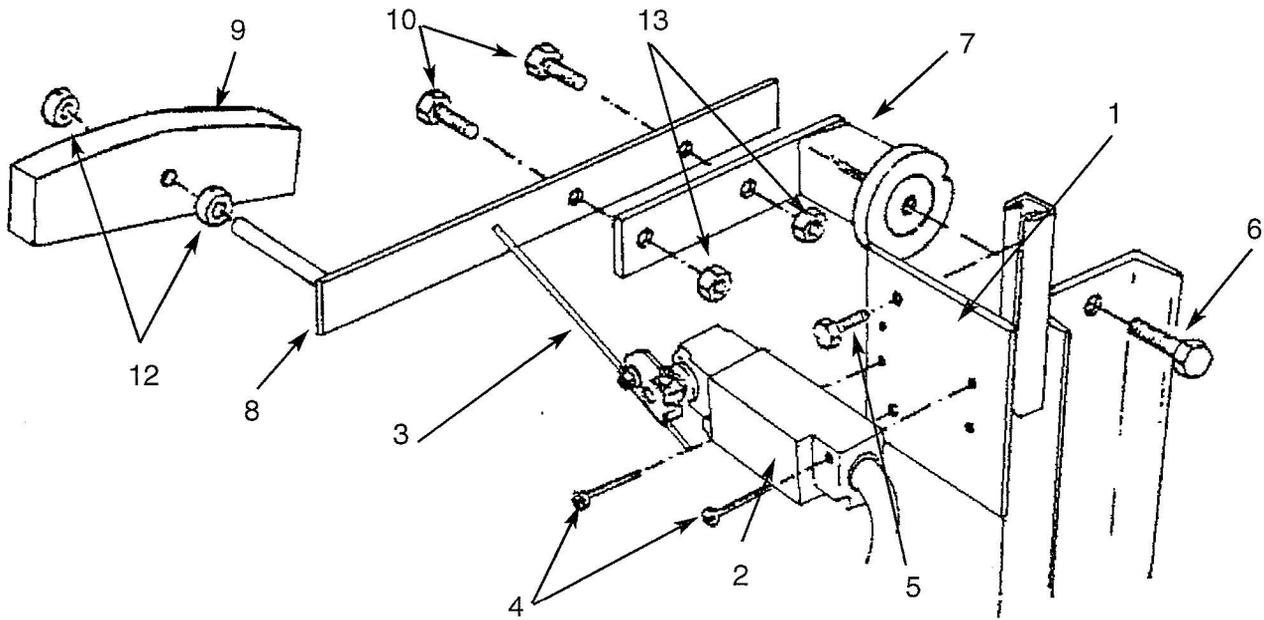
PFL-2309-A

Item	Qty.	Part No.	Description
1	1	6191-0000	Toggle, #60 Chain
		6190-0000	Toggle, #80 Chain
		6189-0000	Toggle, #100 Chain
		6188-0000	Toggle, #120 Chain
		7924-0000	Toggle, #140 Chain
2	2	5667-1001	Master Link, #60 Chain
		2692-1001	Master Link, #80 Chain
		2693-1001	Master Link #100 Chain
		4102-1001	Master Link, #120 Chain
		7880-1001	Master Link, #140 Chain
3		5667-1000	Lift Chain, #60
		2692-1000	Lift Chain, #80
		2693-1000	Lift Chain, #100
		4102-1000	Lift Chain #120
		7880-1000	Lift Chain #140
4			See Chain Tensioner
5	2	7651-0000	Swivel, Round Eye Double
6	1	3715-0000	"S" Hook
7	1	7938-0000	Chain, #35 x Length (Typ)
8	1	7953-0000	Master Link, #35 Chain
9			Chain Tensioner Sprocket & Bracket Furnished with CT
10			Lift Sprocket

F Series

Drive Chain Tension Sensor Assembly

Typical (Four Units per Series F)- Located at Top Drive Assembly

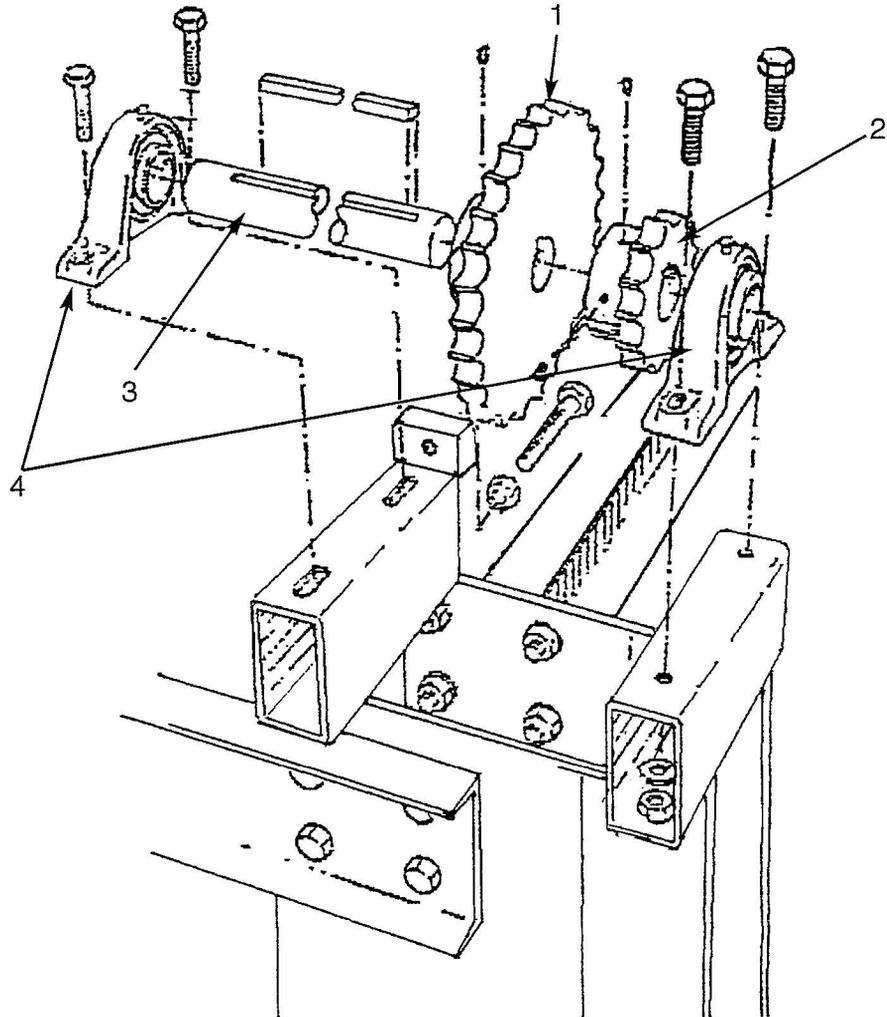


PFL-1381

Item	Qty.	Part No.	Description
1	1	6483-0000	Plate, Switch Mounting
2	1	**	Switch, Limit
3	1	5959-0000	Adjustable Rod (for Limit Switch)
4	2	5930-0036	Screw, RHM #10-32 x 1 1/4
5	2	6029-0016	Screw HHC, 1/2-20 x 1
6	1		Screw, HHC M12 x 40
7	1	5933-0000	Tensioner, Elastomeric
8	1	9561-0000	Arm, Extension, Tensioner
9	1	6894	Guide, Tension #120 Chain
	1	7564-1000	Guide, Tension #100 Chain
10	2	6755-0024	Screw, HH, 1/2-13 x 1 1/2
11	2	5858-0013	Lockwasher, 1/2
12	2	6719-0011	Set Collar, 3/4 diameter
13	2	6358-0013	Nut, Hex 1/2-13
7-13	4	6541-0001	Sensor Assembly, #120/#140 Drive Chain
7-13	4	6541-0000	Sensor Assembly, #100 Drive Chain

**P/N 2893-0005 Typical - Contact Pflow Industries for limit switch part number. Lift serial number required.

Corner Sprocket Assembly

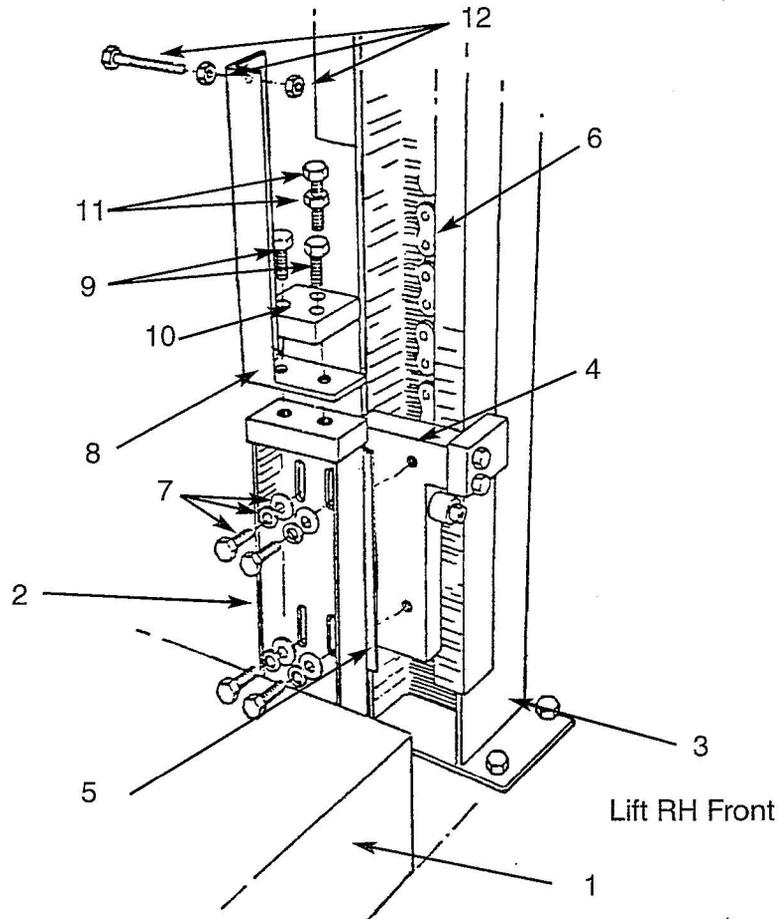


PFL-1374

Item	Qty.	Part No.	Description
1			Drive Sprocket
2			Lift Sprocket
3			Shaft
4			Bearing

F Series

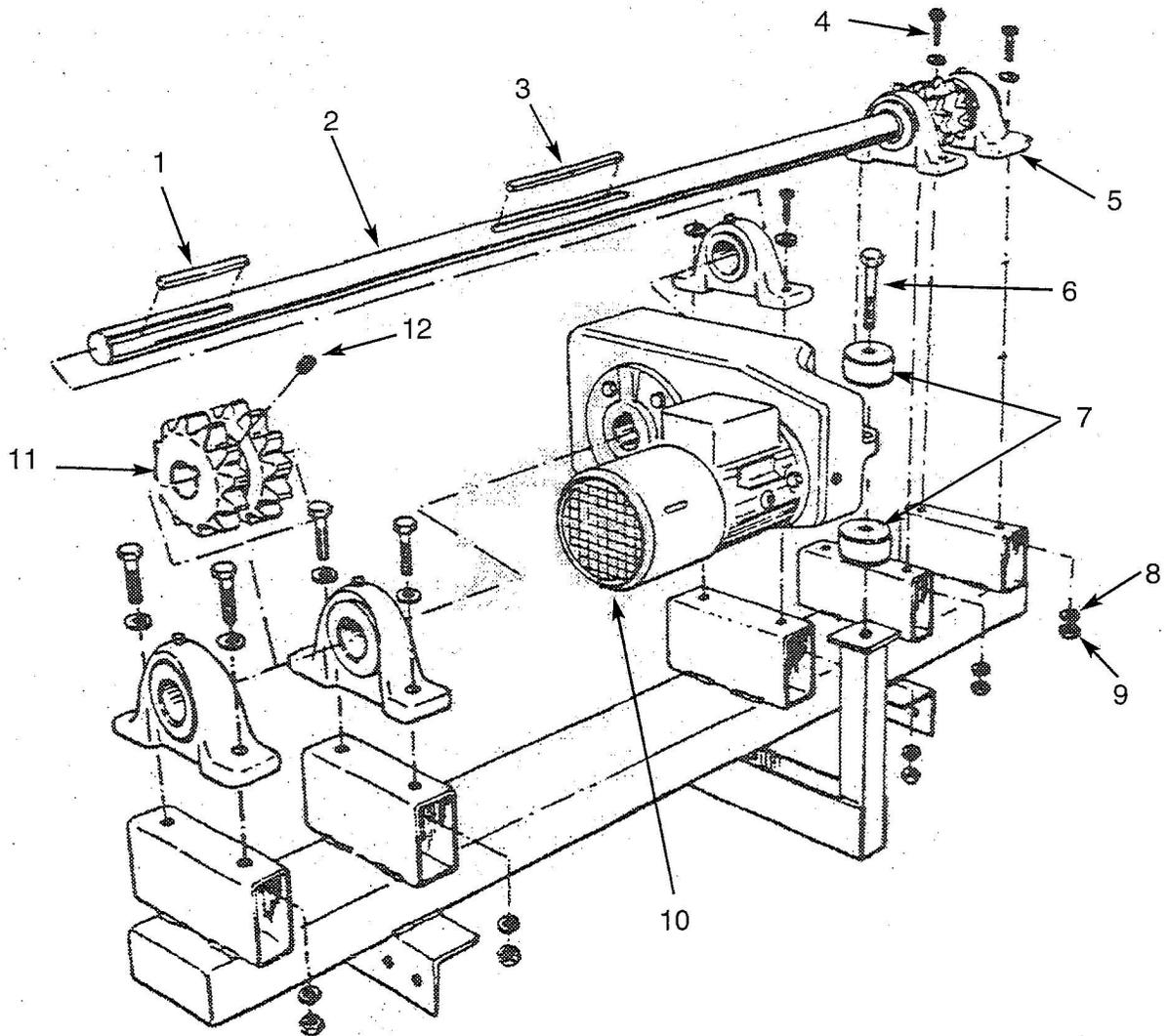
Wheelblock Adjustment Block



PFL-2309A

Item	Qty.	Part No.	Description
1			Carriage
2			Carriage Upright
3			Column
4			Wheelblock (LH Shown)
5			Wheelblock Shim (Typical 1/8")
6			Lift Chain
7			5/8" Hardware
8			Standoff
9			Jackscrew Block Mounting Hardware, 3/4"
10			Jackscrew Block
11			Jackscrew & Nut, 3/4"

Drive Assembly



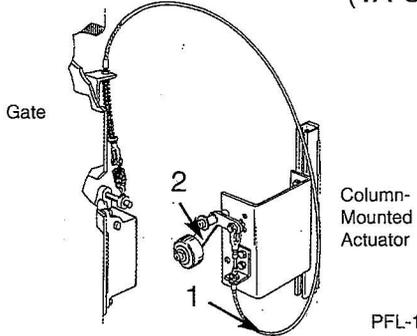
PFL-2458

Item	Qty.	Part No.	Description
1	2		Key, Drive Sprocket
2	1		Drive Shaft
3	1		Key, Reducer
4	10		Screw, HHC
5	5		Bearing, Pillowblock
6	1		Screw, HHC
7	2		Bushing, Reducer
8	10		Lockwasher Jackscrew & Nut, 3/4"
9	12		Nut, Hex
10	1		Brake Motor
11	2		Sprocket, Drive
12	4		Set Screw

Series F

The **INTERLOCK** is a device used to mechanically prevent the gate from opening. Below are the standard types of interlocks supplied. As this is a safety device, replacement components are only available as shown below. Some configurations may vary by application.

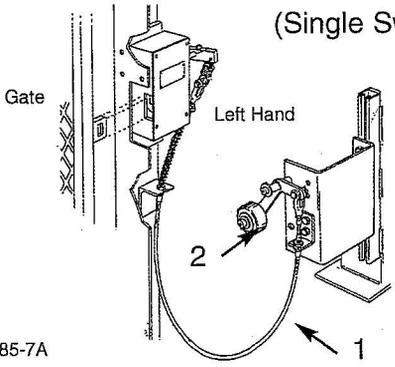
ANDERSON CABLE
(VA Gate)



Column-Mounted Actuator

PFL-1885-6A

GAL CABLE
(Single Swing Gate)

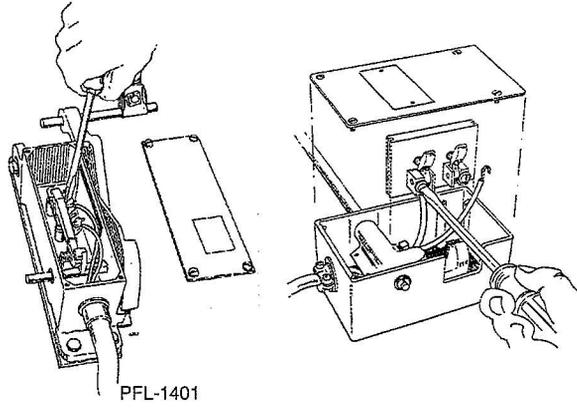


Left Hand

PFL-1885-7A

1. Control Cable Assembly
10' - #9292-0120
15' - #9292-0180
25' - #9292-0300
30' - #9292-0360
2. Roller Arm Assembly #9280-0000
Wheel Only #9284-0040

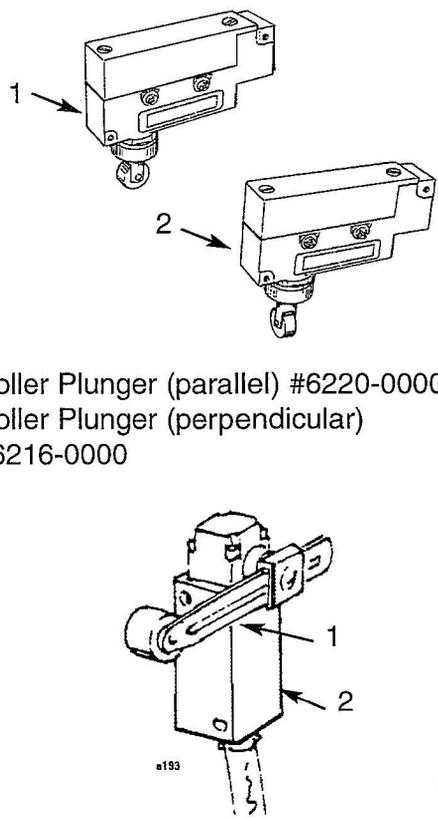
ANDERSON **GAL**



PFL-1401

See schematic for proper wiring instructions.

OPTIONAL - A GATE STATUS SWITCH is supplied when the contacts are not being used. If required, it will be mounted to the gate post or header. Normally the GAL and Anderson interlocks do not use this switch. Specific order requirements may dictate otherwise.



PFL-1293

1. Roller Plunger (parallel) #6220-0000
2. Roller Plunger (perpendicular) #6216-0000

PFL-1205

1. Adjustable Roller Arm #2891-0005
2. Switch #2893-0005

Recommended Storage Requirements

RECOMMENDED STORAGE REQUIREMENTS

ENVIRONMENT

All components should be stored indoors. The area of storage should be kept at a constant temperature above 55 degrees and relative humidity of approximately 40%, free from heavy dust and contaminants. Outdoor storage is NOT recommended.

STACKING

Except for placing the parts container and bracing on the empty carriage, stacking of the various gate components is strictly forbidden. Enclosure and gate panels will warp. Objects on top of the columns and drive base assembly may cause severe damage.

LONG-TERM STORAGE, more than two months after shipment, will require that the following maintenance procedures be performed every sixty days from date of shipment:

1. CHAINS stored for an extended period of time or in a corrosive environment need to be dipped in a non-detergent oil to retain their original condition.
2. SPROCKETS shall be coated lightly with a non-detergent oil to prevent corrosion.
3. SAFETY CAMS are a part of the WHEEL-BLOCK ASSEMBLY and should be lubricated with a non-detergent oil and rotated to ensure free operation.
4. DRIVE BASE ASSEMBLY. The drive base should be cycled. The drive base will need to have the motor/brake powered with temporary power of the correct voltage and the correct brake wiring configuration. Rotate the drive shaft and cycle the brake at least one rotation of the drive shaft. The brake should also be cycled manually several times using the lever on the side of the motor. After rotating with temporary power, the air vent plug should be removed and the solid plug installed to prevent contamination of the reducer oil. Before initial use, the reducer oil should be changed.
5. PILLOWBLOCK BEARINGS have to be greased with lithium-type grease.
6. ELECTRICAL COMPONENTS should be plugged to prevent moisture and other contaminants from entering them. Store in a dry place to prevent corrosion. Place desiccant packs in the control panel
7. PARTS CRATE must remain sealed and dry. Place desiccant packs in the parts crate.

For units stored longer than six months, it is recommended that you contact the Product Support Department of Pflow Industries for additional information that may be available prior to starting up your unit.

Our warranty policy does not cover damage as a result of improper storage.

F Series

ELECTRICAL TERMINOLOGY AND APPLICATIONS

Ruling Bodies:

NEMA - National Electrical Manufacturers Association - (National testing and manufacturing standards body of electrical apparatus.)

UL - Underwriters Laboratories, Inc. - (Independent testing laboratory - some cities require UL control panels and electrical apparatus.)

JIC - Joint Industry Council - (Advisory group to provide standards for production equipment, safety and dependability.)

NFPA - National Fire Protection Association - (Ruling board of NEC - sets national fire/safety standards for equipment/plants.)

CSA - Canadian Standards Association - (Regulatory agency of Canada - CSA required stamp on electrical devices in Canada.)

ANSI - American National Standards Institute - (Adopts code; sets committees.)

ASME - American Society of Mechanical Engineers - (Writes codes - Secretariat for ANSI.)

NEC - National Electrical Code - (Advisory board to NFPA - their recommendation/codes are usually adopted throughout the USA.)

OTHERS - GM, Ford, Dupont, etc.
Customers may have special plant specifications incorporating several ruling bodies or their own electrical code specifications.

Pflow's Standard

NEMA type 1 classification is a general purpose, indoor only, usage. Only COMMERCIAL users generally accept this type: i.e., retail stores, mini storage, warehouses, etc.

NOTE

INDUSTRY does not accept (this NEMA type 1): i.e., auto manufacturing, chemical manufacturing, and paper manufacturing.

All other Pflow units are NEMA 12 classification in regard to the controls, push button stations, and electrical design built under the following standards:

JIC: EMP-1 Electrical standards for mass production equipment.

JIC: Electrical standards for general purpose machine tools.

NFPA 79: Electrical standard for industrial machinery

NEMA type 12 classification is an indoor only usage with gasket protection from dust, dirt, fiber flyings, dripping water, and external condensation of non-corrosive liquids.

NOTE

If JIC is to be strictly adhered to, they require that all devices be minimum NEMA 12, rigid conduit, specific wire coloring, etc. (controls and field wiring).

NOTE

You should note that the NEMA rating of equipment is based on the electrical device(s) with the lowest NEMA type.

EXAMPLES: 1) If we provide a JIC NEMA 12 standard control package with an Anderson or VA gate interlock, our NEMA rating goes to NEMA type 1; and we lose our JIC rating. 2) If we provide a GAL interlock, which has exposed electrical contacts, we rate no NEMA rating and lose our JIC rating. 3) If we provide EMT conduit or don't provide the proper JIC electrical field wiring techniques, we lose our JIC rating.

Outdoor Application

Outdoor units or electrical devices exposed to severe weather conditions should not be rated less than NEMA type 4. This is a watertight, dust-tight indoor-outdoor classification that will provide protection against splashing water, seepage of water, falling or hose-directed water, and severe external condensation.

Corrosive Application

The Chemical Industry on the whole usually specifies a minimum NEMA type 4X. A NEMA 4X rating is similar to a NEMA 4 with added corrosion resistance.

Electrical Terminology and Applications

Hazardous Locations

Hazardous locations are an extremely specialized electrical classification. Few electrical experts exist in this field. All explosion-proof hazardous locations must be handled on an individual job site condition.

The NEC has three classes (I, II, III), - two divisions, (1 and 2) and seven group designations (A, B, C, D, E, F, and G).

Class Definitions:

CLASS I Locations: Those in which flammable gasses or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures.

CLASS II Locations: Those where the presence of combustible dust presents a fire or explosion hazard.

CLASS III Locations: Those where easily ignitable fibers or flyings are present but not likely to be suspended in the air in quantities sufficient to produce ignitable mixtures.

Division Definitions:

DIVISION 1 is an extremely dangerous explosive condition that exists normally.

DIVISION 2 is a dangerous explosive condition that could exist but usually does not.

GROUP designations are given by the NFPA, State Fire Marshals, insurance companies or consulting engineering firms according to the gasses/dust, etc. in the area and the spark or temperature needed to produce an explosion.

Currently, in order to provide competitive pricing in the hazardous location area, we are producing "intrinsically safe" control packages. Intrinsically safe is defined as: electrical devices provided cannot produce a spark or temperature hot enough to ignite the surrounding gasses/dust, etc.

Optional Control Packages and Devices for Hazardous Locations

NEMA type 7, Class I, Division 1 and 2, Group A, B, C, or D enclosures shall be capable of withstanding the pressures resulting from an internal explosion of specified gas and shall contain such an explosion sufficiently so that an explosive gas mixture existing in the atmosphere will not be ignited.

NEMA type 9 is similar to NEMA type 7 but is rated for dust ignition-proof - Class II, Division 1 and 2, Groups E, F, or G.

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PARTS AND LABOR

Parts:

Structure..... Lifetime
Manufactured Components..... 1 Year
Purchased Components..... 1 Year

Labor:

Structure.....Lifetime
Manufactured Components..... 1 Year
Purchased Components..... 90 Days

WARRANTY

The warranty period begins 30 days after shipment. All warranty work must be pre-authorized by PFlow Industries' Product Support Department prior to starting work. All billing must be in accordance with our Warranty Procedures. Replacement of defective parts will be handled in accordance with PFlow's Return Goods Authorization policy. If PFlow Industries determines that equipment failures were caused by abuse, improper installation, or lack of maintenance, they will not be covered. PFlow Industries will not accept consequential losses (missed production, etc.), premium time labor, or air freight charges. Manufactured items are defined as those components manufactured and/or assembled by PFlow. Structure is defined as columns and carriage (excluding carriage side guards). Purchased items are those components that are used as supplied by vendors. Gates and enclosures are excluded and covered for 90 days parts and labor. This warranty applies to all models and may not be modified or extended except by written authorization from PFlow Industries, Inc.

- Manufactured items are defined as those components manufactured and or assembled by PFlow.
- Structure is defined as a columns and carriage.
- Purchased items are those components that are used as supplied by vendors.

PRE-AUTHORIZATION

PFlow Industries must be notified of the problem before we can authorize the repair. We need to determine the cause of the problem, who should be doing the work and what is involved. If it is our decision to have your organization or your subcontractor do the work, you will be given an authorization number which must be referenced on all subsequent paperwork. During our non-working hours, we ask that you notify us by phone or FAX during the next business day. Issuance of an authorization number does not guarantee approval and or payment.

INVOICES

1. You have 30 days past the date the work was completed to submit an invoice for approval. If approved, payment is made 30 days from the date of approval.
2. A deduction from outstanding payments to PFlow for warranty is NEVER authorized and will result in a 10% processing fee.
3. Invoices received without sufficient information will be returned. They will be reconsidered for approval when complete documentation is received. All invoices must include, in detail, the following:
 - Description of the problem.
 - PFlow serial number.
 - Labor hours expended resolving the problem.
 - Rater per hour.
 - Travel time incurred.
 - Date the work was performed.
 - Copies of receipts for materials purchased locally or labor sub-contracted.

COMMENTS

- PFlow Industries is not responsible for payment made on claims prior to our approval.
- Local purchase of components must be pre-authorized.
- Where distance and or experience may be more cost-effective, PFlow Industries reserves the right to use alternate organizations.
- Labor is defined as a maximum of two hours travel per call, plus reasonable onsite repair time as determined by PFlow Industries

Notes

Thank you for giving us the opportunity to serve you. We appreciate your business and want to make sure we meet your expectations. Please help us by taking a few minutes to tell us about the equipment and service that you have received so far. Please answer the questions and return this form to PFlow Industries, Inc. Product Support Department. If more space is needed, please use the reverse side of this page.

1	Did you receive the equipment in good condition?	Yes	No	
	If No, please describe any damage.			
2	Did you receive the equipment shipment complete as expected?	Yes	No	
	If No, what was missing?			
3	Was the equipment manufactured correctly?	Yes	No	
	If No, describe concerns in the workmanship.			
4	Did it match the General Arrangement (GA) drawing?	Yes	No	
5	Was the unit (i.e., lift, gates, and enclosures) dimensionally correct (did it fit)?	Yes	No	
	If No, describe in detail any problem areas			
6	After the completion of the electrical installation was it necessary to return for final adjustments, testing, and training?	Yes	No	
	If No, were you able to hook up temporary power to test the unit and make all final adjustments?		Yes	No
	If Yes, were there any electrical problems that you were made aware?			
7	Were the electrical components a concern?	Yes	No	
	If Yes, describe			
8	Was the electrical field wiring completed as required?	Yes	No	
	If No, describe			
9	Were you able to test the unit at full capacity?	Yes	No	
10	Did you test all the gates to ensure proper operation and interlock operation?	Yes	No	
11	Comments:			
PFlow Job Number				Date
Customer/User				
Questionnaire completed by				email
Company			Phone	

PFlow Industries, Inc. • 6720 N. Teutonia Avenue • Milwaukee, WI. 53209
Phone - Main Switchboard: (414) 352-9000 • Product Support Dept: Fax - (414) 247-9834; email: psd@pflow.com

Notes

Notes

MATERIAL SAFETY DATA SHEET

F78XXL13851-4357
00 01

DATE OF PREPARATION
Dec 21, 2013

SECTION 1 — PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NUMBER

F78XXL13851-4357

PRODUCT NAME

Fast Dry Acrylic Enamel, FDA PFlow Blue VOC

MANUFACTURER'S NAME

THE SHERWIN-WILLIAMS COMPANY
101 Prospect Avenue N.W.
Cleveland, OH 44115

Telephone Numbers and Websites

Regulatory Information	(216) 566-2902
Medical Emergency	(216) 566-2917
Transportation Emergency*	(800) 424-9300
<i>*for Chemical Emergency ONLY (spill, leak, fire, exposure, or accident)</i>	

SECTION 2 — COMPOSITION/INFORMATION ON INGREDIENTS

% by Weight	CAS Number	Ingredient	Units	Vapor Pressure
4	64742-89-8	V. M. & P. Naphtha		
		ACGIH TLV	300 PPM	12 mm
		OSHA PEL	300 PPM	
		OSHA PEL	400 PPM STEL	
9	108-88-3	Toluene		
		ACGIH TLV	20 PPM	22 mm
		OSHA PEL	100 ppm (Skin)	
		OSHA PEL	150 ppm (Skin) STEL	
4	100-41-4	Ethylbenzene		
		ACGIH TLV	20 PPM	7.1 mm
		OSHA PEL	100 PPM	
		OSHA PEL	125 PPM STEL	
22	1330-20-7	Xylene		
		ACGIH TLV	100 PPM	5.9 mm
		ACGIH TLV	150 PPM STEL	
		OSHA PEL	100 PPM	
		OSHA PEL	150 PPM STEL	
24	67-64-1	Acetone		
		ACGIH TLV	500 PPM	180 mm
		ACGIH TLV	750 PPM STEL	
		OSHA PEL	1000 PPM	
4	110-19-0	Isobutyl Acetate		
		ACGIH TLV	150 PPM	12.5 mm
		OSHA PEL	150 PPM	
1	108-65-6	1-Methoxy-2-Propanol Acetate		
		ACGIH TLV	Not Available	1.8 mm
		OSHA PEL	Not Available	
3	112926-00-8	Amorphous Precipitated Silica		
		ACGIH TLV	10 mg/m3 as Dust	
		OSHA PEL	6 mg/m3 as Dust	
2	14807-96-6	Talc		
		ACGIH TLV	2 mg/m3 as Resp. Dust	
		OSHA PEL	2 mg/m3 as Resp. Dust	
4	13463-67-7	Titanium Dioxide		
		ACGIH TLV	10 mg/m3 as Dust	
		OSHA PEL	10 mg/m3 Total Dust	
		OSHA PEL	5 mg/m3 Respirable Fraction	
0.3	1333-86-4	Carbon Black		
		ACGIH TLV	3.5 MG/M3	
		OSHA PEL	3.5 MG/M3	

SECTION 3 — HAZARDS IDENTIFICATION

ROUTES OF EXPOSURE

INHALATION of vapor or spray mist.
EYE or SKIN contact with the product, vapor or spray mist.

EFFECTS OF OVEREXPOSURE

EYES: Irritation.

SKIN: Prolonged or repeated exposure may cause irritation.

INHALATION: Irritation of the upper respiratory system.

May cause nervous system depression. Extreme overexposure may result in unconsciousness and possibly death.

Prolonged overexposure to hazardous ingredients in Section 2 may cause adverse chronic effects to the following organs or systems:

- the liver
- the urinary system
- the hematopoietic (blood-forming) system
- the cardiovascular system
- the reproductive system

SIGNS AND SYMPTOMS OF OVEREXPOSURE

Headache, dizziness, nausea, and loss of coordination are indications of excessive exposure to vapors or spray mists.

Redness and itching or burning sensation may indicate eye or excessive skin exposure.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

None generally recognized.

CANCER INFORMATION

For complete discussion of toxicology data refer to Section 11.

HMIS Codes

Health	2*
Flammability	3
Reactivity	0

SECTION 4 — FIRST AID MEASURES

EYES: Flush eyes with large amounts of water for 15 minutes. Get medical attention.

SKIN: Wash affected area thoroughly with soap and water.
Remove contaminated clothing and laundry before re-use.

INHALATION: If affected, remove from exposure. Restore breathing. Keep warm and quiet.

INGESTION: Do not induce vomiting. Get medical attention immediately.

SECTION 5 — FIRE FIGHTING MEASURES

FLASH POINT	LEL	UEL	FLAMMABILITY CLASSIFICATION
1 °F TCC	0.9	13.1	RED LABEL -- Extremely Flammable, Flash below 21 °F (-6 °C)

EXTINGUISHING MEDIA

Carbon Dioxide, Dry Chemical, Foam

UNUSUAL FIRE AND EXPLOSION HAZARDS

Closed containers may explode when exposed to extreme heat.

Application to hot surfaces requires special precautions.

During emergency conditions overexposure to decomposition products may cause a health hazard. Symptoms may not be immediately apparent. Obtain medical attention.

SPECIAL FIRE FIGHTING PROCEDURES

Full protective equipment including self-contained breathing apparatus should be used.

Water spray may be ineffective. If water is used, fog nozzles are preferable. Water may be used to cool closed containers to prevent pressure build-up and possible autoignition or explosion when exposed to extreme heat.

SECTION 6 — ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Remove all sources of ignition. Ventilate the area.

Remove with inert absorbent.

SECTION 7 — HANDLING AND STORAGE

STORAGE CATEGORY

DOL Storage Class IB

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Contents are EXTREMELY FLAMMABLE. Keep away from heat, sparks, and open flame. Vapors will accumulate readily and may ignite explosively.

During use and until all vapors are gone: Keep area ventilated - Do not smoke - Extinguish all flames, pilot lights, and heaters - Turn off stoves, electric tools and appliances, and any other sources of ignition.

Consult NFPA Code. Use approved Bonding and Grounding procedures.

Keep container closed when not in use. Transfer only to approved containers with complete and appropriate labeling. Do not take internally. Keep out of the reach of children.

SECTION 8 — EXPOSURE CONTROLS/PERSONAL PROTECTION

PRECAUTIONS TO BE TAKEN IN USE

Use only with adequate ventilation.

Avoid contact with skin and eyes. Avoid breathing vapor and spray mist.

Wash hands after using.

This coating may contain materials classified as nuisance particulates (listed "as Dust" in Section 2) which may be present at hazardous levels only during sanding or abrading of the dried film. If no specific dusts are listed in Section 2, the applicable limits for nuisance dusts are ACGIH TLV 10 mg/m³ (total dust), 3 mg/m³ (respirable fraction), OSHA PEL 15 mg/m³ (total dust), 5 mg/m³ (respirable fraction).

VENTILATION

Local exhaust preferable. General exhaust acceptable if the exposure to materials in Section 2 is maintained below applicable exposure limits. Refer to OSHA Standards 1910.94, 1910.107, 1910.108.

RESPIRATORY PROTECTION

If personal exposure cannot be controlled below applicable limits by ventilation, wear a properly fitted organic vapor/particulate respirator approved by NIOSH/MSHA for protection against materials in Section 2.

When sanding or abrading the dried film, wear a dust/mist respirator approved by NIOSH/MSHA for dust which may be generated from this product, underlying paint, or the abrasive.

PROTECTIVE GLOVES

Wear gloves which are recommended by glove supplier for protection against materials in Section 2.

EYE PROTECTION

Wear safety spectacles with unperforated sideshields.

OTHER PRECAUTIONS

Intentional misuse by deliberately concentrating and inhaling the contents can be harmful or fatal.

SECTION 9 — PHYSICAL AND CHEMICAL PROPERTIES

PRODUCT WEIGHT	7.84 lb/gal	939 g/l
SPECIFIC GRAVITY	0.94	
BOILING POINT	132 - 325 °F	55 - 162 °C
MELTING POINT	Not Available	
VOLATILE VOLUME	77%	
EVAPORATION RATE	Slower than ether	
VAPOR DENSITY	Heavier than air	
SOLUBILITY IN WATER	Not Available	
VOLATILE ORGANIC COMPOUNDS (VOC Theoretical - As Packaged)		
	4.90 lb/gal	588 g/l
	3.52 lb/gal	422 g/l
	Less Water and Federally Exempt Solvents Emitted VOC	

SECTION 10 — STABILITY AND REACTIVITY

STABILITY — Stable

CONDITIONS TO AVOID

None known.

INCOMPATIBILITY

None known.

HAZARDOUS DECOMPOSITION PRODUCTS

By fire: Carbon Dioxide, Carbon Monoxide

HAZARDOUS POLYMERIZATION

Will not occur

SECTION 11 — TOXICOLOGICAL INFORMATION

CHRONIC HEALTH HAZARDS

Reports have associated repeated and prolonged overexposure to solvents with permanent brain and nervous system damage.

Ethylbenzene is classified by IARC as possibly carcinogenic to humans (2B) based on inadequate evidence in humans and sufficient evidence in laboratory animals. Lifetime inhalation exposure of rats and mice to high ethylbenzene concentrations resulted in increases in certain types of cancer, including kidney tumors in rats and lung and liver tumors in mice. These effects were not observed in animals exposed to lower concentrations. There is no evidence that ethylbenzene causes cancer in humans.

IARC's Monograph No. 93 reports there is sufficient evidence of carcinogenicity in experimental rats exposed to titanium dioxide but inadequate evidence for carcinogenicity in humans and has assigned a Group 2B rating. In addition, the IARC summary concludes, "No significant exposure to titanium dioxide is thought to occur during the use of products in which titanium is bound to other materials, such as paint."

Carbon Black is classified by IARC as possibly carcinogenic to humans (group 2B) based on experimental animal data, however, there is insufficient evidence in humans for its carcinogenicity.

TOXICOLOGY DATA

CAS No.	Ingredient Name			
64742-89-8	V. M. & P. Naphtha	LC50 RAT LD50 RAT	4HR	Not Available Not Available
108-88-3	Toluene	LC50 RAT LD50 RAT	4HR	4000 ppm 5000 mg/kg
100-41-4	Ethylbenzene	LC50 RAT LD50 RAT	4HR	Not Available 3500 mg/kg
1330-20-7	Xylene	LC50 RAT LD50 RAT	4HR	5000 ppm 4300 mg/kg
67-64-1	Acetone	LC50 RAT LD50 RAT	4HR	Not Available 5800 mg/kg
110-19-0	Isobutyl Acetate	LC50 RAT LD50 RAT	4HR	Not Available 13400 mg/kg
108-65-6	1-Methoxy-2-Propanol Acetate	LC50 RAT LD50 RAT	4HR	Not Available 8500 mg/kg
112926-00-8	Amorphous Precipitated Silica	LC50 RAT LD50 RAT	4HR	Not Available 4500 mg/kg
14807-96-6	Talc	LC50 RAT LD50 RAT	4HR	Not Available Not Available
13463-67-7	Titanium Dioxide	LC50 RAT LD50 RAT	4HR	Not Available Not Available
1333-86-4	Carbon Black	LC50 RAT LD50 RAT	4HR	Not Available Not Available

SECTION 12 — ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION

No data available.

SECTION 13 — DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD

Waste from this product may be hazardous as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR 261. Waste must be tested for ignitability to determine the applicable EPA hazardous waste numbers. Incinerate in approved facility. Do not incinerate closed container. Dispose of in accordance with Federal, State/Provincial, and Local regulations regarding pollution.

SECTION 14 — TRANSPORT INFORMATION

Multi-modal shipping descriptions are provided for informational purposes and do not consider container sizes. The presence of a shipping description for a particular mode of transport (ocean, air, etc.), does not indicate that the product is packaged suitably for that mode of transport. All packaging must be reviewed for suitability prior to shipment, and compliance with the applicable regulations is the sole responsibility of the person offering the product for transport.

US Ground (DOT)

5 Liters (1.3 Gallons) and Less may be Classed as LTD. QTY. OR ORM-D
Larger Containers are Regulated as:
UN1263, PAINT, 3, PG II, (ERG#128)

DOT (Dept of Transportation) Hazardous Substances & Reportable Quantities

Acetone 5000 lb RQ
Ethylbenzene 1000 lb RQ
Toluene 1000 lb RQ
Xylenes (isomers and mixture) 100 lb RQ

Bulk Containers may be Shipped as (check reportable quantities):

RQ, UN1263, PAINT, 3, PG II, (XYLENES (ISOMERS AND MIXTURE)),
(ERG#128)

Canada (TDG)

UN1263, PAINT, CLASS 3, PG II, (ERG#128)

IMO

5 Liters (1.3 Gallons) and Less may be Shipped as Limited Quantity.

UN1263, PAINT, CLASS 3, PG II, (-17 C c.c.), EmS F-E, S-E

IATA/CAO

UN1263, PAINT, 3, PG II

SECTION 15 — REGULATORY INFORMATION

SARA 313 (40 CFR 372.65C) SUPPLIER NOTIFICATION

CAS No.	CHEMICAL/COMPOUND	% by WT	% Element
108-88-3	Toluene	9	
100-41-4	Ethylbenzene	4	
1330-20-7	Xylene	22	

CALIFORNIA PROPOSITION 65

WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

TSCA CERTIFICATION

All chemicals in this product are listed, or are exempt from listing, on the TSCA Inventory.

SECTION 16 — OTHER INFORMATION

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

The above information pertains to this product as currently formulated, and is based on the information available at this time. Addition of reducers or other additives to this product may substantially alter the composition and hazards of the product. Since conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information.

MATERIAL SAFETY DATA SHEET

B50XXW10463-4357
00 01

DATE OF PREPARATION
Dec 21, 2013

SECTION 1 — PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NUMBER

B50XXW10463-4357

PRODUCT NAME

UNIVERSAL PRIMER, White B50-WZ1

MANUFACTURER'S NAME

THE SHERWIN-WILLIAMS COMPANY
101 Prospect Avenue N.W.
Cleveland, OH 44115

Telephone Numbers and Websites

Regulatory Information	(216) 566-2902
Medical Emergency	(216) 566-2917
Transportation Emergency*	(800) 424-9300
<i>*for Chemical Emergency ONLY (spill, leak, fire, exposure, or accident)</i>	

SECTION 2 — COMPOSITION/INFORMATION ON INGREDIENTS

% by Weight	CAS Number	Ingredient	Units	Vapor Pressure
2	108-88-3	Toluene		
		ACGIH TLV	20 PPM	22 mm
		OSHA PEL	100 ppm (Skin)	
		OSHA PEL	150 ppm (Skin) STEL	
1	100-41-4	Ethylbenzene		
		ACGIH TLV	20 PPM	7.1 mm
		OSHA PEL	100 PPM	
		OSHA PEL	125 PPM STEL	
7	1330-20-7	Xylene		
		ACGIH TLV	100 PPM	5.9 mm
		ACGIH TLV	150 PPM STEL	
		OSHA PEL	100 PPM	
		OSHA PEL	150 PPM STEL	
2	64742-95-6	Light Aromatic Hydrocarbons		
		ACGIH TLV	Not Available	3.8 mm
		OSHA PEL	Not Available	
2	95-63-6	1,2,4-Trimethylbenzene		
		ACGIH TLV	25 PPM	2.03 mm
		OSHA PEL	25 PPM	
35	67-64-1	Acetone		
		ACGIH TLV	500 PPM	180 mm
		ACGIH TLV	750 PPM STEL	
		OSHA PEL	1000 PPM	
3	14807-96-6	Talc		
		ACGIH TLV	2 mg/m3 as Resp. Dust	
		OSHA PEL	2 mg/m3 as Resp. Dust	
25	471-34-1	Calcium Carbonate		
		ACGIH TLV	10 mg/m3 as Dust	
		OSHA PEL	15 mg/m3 Total Dust	
		OSHA PEL	5 mg/m3 Respirable Fraction	
7	13463-67-7	Titanium Dioxide		
		ACGIH TLV	10 mg/m3 as Dust	
		OSHA PEL	10 mg/m3 Total Dust	
		OSHA PEL	5 mg/m3 Respirable Fraction	

SECTION 3 — HAZARDS IDENTIFICATION

ROUTES OF EXPOSURE

INHALATION of vapor or spray mist.
 EYE or SKIN contact with the product, vapor or spray mist.

EFFECTS OF OVEREXPOSURE

EYES: Irritation.
SKIN: Prolonged or repeated exposure may cause irritation.
INHALATION: Irritation of the upper respiratory system.

HMIS Codes

Health	2*
Flammability	3
Reactivity	0

May cause nervous system depression. Extreme overexposure may result in unconsciousness and possibly death.
 Prolonged overexposure to hazardous ingredients in Section 2 may cause adverse chronic effects to the following organs or systems:

- the liver
- the urinary system
- the cardiovascular system
- the reproductive system

SIGNS AND SYMPTOMS OF OVEREXPOSURE

Headache, dizziness, nausea, and loss of coordination are indications of excessive exposure to vapors or spray mists.
 Redness and itching or burning sensation may indicate eye or excessive skin exposure.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

None generally recognized.

CANCER INFORMATION

For complete discussion of toxicology data refer to Section 11.

SECTION 4 — FIRST AID MEASURES

EYES: Flush eyes with large amounts of water for 15 minutes. Get medical attention.
SKIN: Wash affected area thoroughly with soap and water.
 Remove contaminated clothing and laundry before re-use.
INHALATION: If affected, remove from exposure. Restore breathing. Keep warm and quiet.
INGESTION: Do not induce vomiting. Get medical attention immediately.

SECTION 5 — FIRE FIGHTING MEASURES

FLASH POINT -2 °F TCC **LEL** 0.7 **UEL** 12.8 **FLAMMABILITY CLASSIFICATION** RED LABEL -- Extremely Flammable, Flash below 21 °F (-6 °C)

EXTINGUISHING MEDIA

Carbon Dioxide, Dry Chemical, Foam

UNUSUAL FIRE AND EXPLOSION HAZARDS

Closed containers may explode when exposed to extreme heat.
 Application to hot surfaces requires special precautions.
 During emergency conditions overexposure to decomposition products may cause a health hazard. Symptoms may not be immediately apparent. Obtain medical attention.

SPECIAL FIRE FIGHTING PROCEDURES

Full protective equipment including self-contained breathing apparatus should be used.
 Water spray may be ineffective. If water is used, fog nozzles are preferable. Water may be used to cool closed containers to prevent pressure build-up and possible autoignition or explosion when exposed to extreme heat.

SECTION 6 — ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Remove all sources of ignition. Ventilate the area.
 Remove with inert absorbent.

SECTION 7 — HANDLING AND STORAGE

STORAGE CATEGORY

DOL Storage Class IB

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Contents are EXTREMELY FLAMMABLE. Keep away from heat, sparks, and open flame. Vapors will accumulate readily and may ignite explosively.
 During use and until all vapors are gone: Keep area ventilated - Do not smoke - Extinguish all flames, pilot lights, and heaters - Turn off stoves, electric tools and appliances, and any other sources of ignition.
 Consult NFPA Code. Use approved Bonding and Grounding procedures.
 Keep container closed when not in use. Transfer only to approved containers with complete and appropriate labeling. Do not take internally.
 Keep out of the reach of children.

SECTION 8 — EXPOSURE CONTROLS/PERSONAL PROTECTION

PRECAUTIONS TO BE TAKEN IN USE

Use only with adequate ventilation.

Avoid contact with skin and eyes. Avoid breathing vapor and spray mist.

Wash hands after using.

This coating may contain materials classified as nuisance particulates (listed "as Dust" in Section 2) which may be present at hazardous levels only during sanding or abrading of the dried film. If no specific dusts are listed in Section 2, the applicable limits for nuisance dusts are ACGIH TLV 10 mg/m³ (total dust), 3 mg/m³ (respirable fraction), OSHA PEL 15 mg/m³ (total dust), 5 mg/m³ (respirable fraction).

VENTILATION

Local exhaust preferable. General exhaust acceptable if the exposure to materials in Section 2 is maintained below applicable exposure limits. Refer to OSHA Standards 1910.94, 1910.107, 1910.108.

RESPIRATORY PROTECTION

If personal exposure cannot be controlled below applicable limits by ventilation, wear a properly fitted organic vapor/particulate respirator approved by NIOSH/MSHA for protection against materials in Section 2.

When sanding or abrading the dried film, wear a dust/mist respirator approved by NIOSH/MSHA for dust which may be generated from this product, underlying paint, or the abrasive.

PROTECTIVE GLOVES

Wear gloves which are recommended by glove supplier for protection against materials in Section 2.

EYE PROTECTION

Wear safety spectacles with unperforated sideshields.

OTHER PRECAUTIONS

Intentional misuse by deliberately concentrating and inhaling the contents can be harmful or fatal.

SECTION 9 — PHYSICAL AND CHEMICAL PROPERTIES

PRODUCT WEIGHT	9.62 lb/gal	1153 g/l
SPECIFIC GRAVITY	1.16	
BOILING POINT	132 - 360 °F	55 - 182 °C
MELTING POINT	Not Available	
VOLATILE VOLUME	73%	
EVAPORATION RATE	Slower than ether	
VAPOR DENSITY	Heavier than air	
SOLUBILITY IN WATER	Not Available	
VOLATILE ORGANIC COMPOUNDS (VOC Theoretical - As Packaged)		
3.28 lb/gal	394 g/l	Less Water and Federally Exempt Solvents
1.58 lb/gal	190 g/l	Emitted VOC

SECTION 10 — STABILITY AND REACTIVITY

STABILITY — Stable

CONDITIONS TO AVOID

None known.

INCOMPATIBILITY

None known.

HAZARDOUS DECOMPOSITION PRODUCTS

By fire: Carbon Dioxide, Carbon Monoxide

HAZARDOUS POLYMERIZATION

Will not occur

SECTION 11 — TOXICOLOGICAL INFORMATION

CHRONIC HEALTH HAZARDS

Reports have associated repeated and prolonged overexposure to solvents with permanent brain and nervous system damage.

Ethylbenzene is classified by IARC as possibly carcinogenic to humans (2B) based on inadequate evidence in humans and sufficient evidence in laboratory animals. Lifetime inhalation exposure of rats and mice to high ethylbenzene concentrations resulted in increases in certain types of cancer, including kidney tumors in rats and lung and liver tumors in mice. These effects were not observed in animals exposed to lower concentrations. There is no evidence that ethylbenzene causes cancer in humans.

IARC's Monograph No. 93 reports there is sufficient evidence of carcinogenicity in experimental rats exposed to titanium dioxide but inadequate evidence for carcinogenicity in humans and has assigned a Group 2B rating. In addition, the IARC summary concludes, "No significant exposure to titanium dioxide is thought to occur during the use of products in which titanium is bound to other materials, such as paint."

TOXICOLOGY DATA

CAS No.	Ingredient Name			
108-88-3	Toluene	LC50 RAT LD50 RAT	4HR	4000 ppm 5000 mg/kg
100-41-4	Ethylbenzene	LC50 RAT LD50 RAT	4HR	Not Available 3500 mg/kg
1330-20-7	Xylene	LC50 RAT LD50 RAT	4HR	5000 ppm 4300 mg/kg
64742-95-6	Light Aromatic Hydrocarbons	LC50 RAT LD50 RAT	4HR	Not Available Not Available
95-63-6	1,2,4-Trimethylbenzene	LC50 RAT LD50 RAT	4HR	Not Available Not Available
67-64-1	Acetone	LC50 RAT LD50 RAT	4HR	Not Available 5800 mg/kg
14807-96-6	Talc	LC50 RAT LD50 RAT	4HR	Not Available Not Available
471-34-1	Calcium Carbonate	LC50 RAT LD50 RAT	4HR	Not Available Not Available
13463-67-7	Titanium Dioxide	LC50 RAT LD50 RAT	4HR	Not Available Not Available

SECTION 12 — ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION

No data available.

SECTION 13 — DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD

Waste from this product may be hazardous as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR 261. Waste must be tested for ignitability to determine the applicable EPA hazardous waste numbers. Incinerate in approved facility. Do not incinerate closed container. Dispose of in accordance with Federal, State/Provincial, and Local regulations regarding pollution.

SECTION 14 — TRANSPORT INFORMATION

Multi-modal shipping descriptions are provided for informational purposes and do not consider container sizes. The presence of a shipping description for a particular mode of transport (ocean, air, etc.), does not indicate that the product is packaged suitably for that mode of transport. All packaging must be reviewed for suitability prior to shipment, and compliance with the applicable regulations is the sole responsibility of the person offering the product for transport.

US Ground (DOT)

5 Liters (1.3 Gallons) and Less may be Classed as LTD. QTY. OR ORM-D
Larger Containers are Regulated as:
UN1263, PAINT, 3, PG II, (ERG#128)

DOT (Dept of Transportation) Hazardous Substances & Reportable Quantities

Acetone 5000 lb RQ
Xylenes (isomers and mixture) 100 lb RQ

Bulk Containers may be Shipped as (check reportable quantities):

RQ, UN1263, PAINT, 3, PG II, (XYLENES (ISOMERS AND MIXTURE)),
(ERG#128)

Canada (TDG)

UN1263, PAINT, CLASS 3, PG II, (ERG#128)

IMO

5 Liters (1.3 Gallons) and Less may be Shipped as Limited Quantity.
UN1263, PAINT, CLASS 3, PG II, (-19 C c.c.), EmS F-E, S-E

IATA/ICAO

UN1263, PAINT, 3, PG II

SECTION 15 — REGULATORY INFORMATION

SARA 313 (40 CFR 372.65C) SUPPLIER NOTIFICATION

CAS No.	CHEMICAL/COMPOUND	% by WT	% Element
108-88-3	Toluene	2	
100-41-4	Ethylbenzene	1	
1330-20-7	Xylene	7	
95-63-6	1,2,4-Trimethylbenzene	2	
	Zinc Compound	1	0.7

CALIFORNIA PROPOSITION 65

WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

TSCA CERTIFICATION

All chemicals in this product are listed, or are exempt from listing, on the TSCA Inventory.

SECTION 16 — OTHER INFORMATION

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

The above information pertains to this product as currently formulated, and is based on the information available at this time. Addition of reducers or other additives to this product may substantially alter the composition and hazards of the product. Since conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information.

Material Safety Data Sheet

IDENTIFICATION Effective Date: January 1, 2013

Manufactured By: Sherwin Williams
 6125 W. Douglas Avenue
 Milwaukee, WI 53218 1596 USA

24-Hour Emergency Telephone
 Domestic US: 1-800-373-7542 International: 1-484-951-2432 Haz Mat Services

Trade Name:	F78XXL13851-4357 2871-0003 PFLOW BLUE PAINT
Mfg. Part Number:	20016 00341 F78XXL13851-4357 2871-0003 PFLOW BLUE PAINT

II. HAZARDOUS INGREDIENTS

CAS #67-64-1 Acetone		Weight %: 20 – 50 Footnote (1)
ACGIH TLV: 500 ppm TWA OSHA PEL: 1000 ppm TWA VAPOR PRESSURE: 185 MM Hg60F	ACGIH STEL: 1000 ppm OSHA CEILING: LEL: 2.6%	OSHA PEAK:
CAS #75-28-5 Isobutane		Weight %: 5 - 20
ACGIH TLV: NE OSHA PEL: NE VAPOR PRESSURE: 3.1 atm	ACGIH STEL: OSHA CEILING: LEL: 1.6%	OSHA PEAK:
CAS # 74-98-6 Propane		Weight %: 5 -20
ACGIH TLV: 2500 ppm TWA OSHA PEL: 1000 ppm TWA VAPOR PRESSURE: 7150mmHg@20c	ACGIH STEL: OSHA CEILING: LEL:	OSHA PEAK:
CAS # 1330-20-7 Xylene		Weight %: 5 – 20 Footnote (1)
ACGIH TLV: 100 ppm TWA OSHA PEL: 100 ppm TWA VAPOR PRESSURE: 6.6mmHg@20c	ACGIH STEL: 150 ppm OSHA CEILING: LEL: 1%	OSHA PEAK:
CAS # 100-41-4 Ethyl Benzene		Weight %: 1 - 5
ACGIH TLV: 100 ppm TWA OSHA PEL: 100 ppm TWA VAPOR PRESSURE:	ACGIH STEL: 125 ppm OSHA CEILING: LEL:	OSHA PEAK:
CAS # 123-42-2 Diacetone Alcohol		Weight %: 1 - 5 Footnote (1)
ACGIH TLV: 50 ppm TWA OSHA PEL: 50 ppm TWA VAPOR PRESSURE: 1 mm	ACGIH STEL: 75 ppm OSHA CEILING: LEL: 1.8%	OSHA PEAK:
CAS #64742-95-6 Aromatic 100		Weight %: 1 - 5 Footnote (1)
ACGIH TLV: OSHA PEL: VAPOR PRESSURE: 2.7 mmHg@20c	ACGIH STEL: OSHA CEILING: LEL: 0.9%	OSHA PEAK:

Warning Messages:

- (1) Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal. Chronic exposure may cause damage to the central nervous system, respiratory system, lung, eye, skin, liver, gastro intestinal tract, spleen, kidneys and blood.
- (2) See Section IX for reportable Hazardous Air Pollutants.

III. PHYSICAL DATA

BOILING RANGE: -43-356 degree Farenheight

EVAPORATION RATE: Propellant: Faster then ether SOLVENT: Slower than ether

PERCENT VOLITILE BY VOLUME: 87.34% WEIGHT PER GALLON: 6.64 LBS.

VAPOR DENSITY: Propellant is lighter than air Solvent is heavier than air

ACTUAL VOC (lb/gal): 3.59

EPA VOC (lb/gal): 4.59

EPA VOC: (g/L): 550.07

IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: -156 Degree Farenheight
 - 105 Degree Celsius

LEL: Refer to Section II

FLAMMABILITY CLASSIFICATION: CLASS 1A

HAZARD CLASSIFICATION: FLAMMABLE

CONSUMER COMMIDTY: ORM-D

EXTINGUISHING MEDIA: *carbon dioxide, dry chemical, or fire foam”

UNUSUAL FIRE AND EXPLOSION HAZARDS: With excessive heat, can will rupture from internal pressure and discharge flammable contents. Vapors may ignite explosively. Keep away from heat, sparks and flame. Do not smoke. Extinguish all flames and pilot lights, turn off stoves, heaters, electric motors and other sources of ignition during use and until all vapors are gone. Prevent build up of vapors by opening all windows and doors to achieve cross-ventilation.

SPECIAL FIRE FIGHTING PROCEDURES: Full protective equipment including self-contained breathing apparatus should be used. Water spray may be ineffective. If water is used, fog nozzles are preferable. Water may be used to cool closed containers to prevent pressure build-up and possible auto ignition or explosion when exposed to extreme heat.

V. HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: See Section II.

EFFECTS OF OVEREXPOSURE:

Inhalation – Anesthetic

Irritation of the respiratory tract or acute nervous system. Depression caused by headache, dizziness, staggering gait, confusion, unconsciousness, dizziness

Acute – High vapor concentrations are irritating to the eyes and the respiratory tract, and may cause headaches, dizziness, anesthesia, drowsiness, unconsciousness, and other central nervous system effects, including death. Product has a low order of acute oral and dermal toxicity, but minute amounts aspirated into the lungs during ingestion or vomiting may cause mild to severe pulmonary injury and possibly death.

Chronic- Xylene contains ethyl benzene which has been classified as a possible carcinogen to humans, group 2B, by the International Agency for the Research on Cancer (IARC), based on sufficient evidence in laboratory animals but inadequate evidence for cancer in humans. Prolonged or repeated overexposure to ethyl benzene may cause the following: kidney effects, liver effects, lung effects, thyroid effects, testicular effects, pituitary effects.

MEDICAL CONDITIONS PRONE TO AGGRAVATION BY EXPOSURE: consult physician

PRIMARY ROUTE (S) OF ENTRY: Eyes, Ingestion, Skin and Inhalation

EMERGENCY AND FIRST AID PROCEDURES:

INHALATION: Remove to fresh air.

EYES: Flush immediately with large amounts of water for at least 15 minutes. Talk to a physician for medical treatment.

SKIN: Wipe off with towel. Wash with soap and water. Remove contaminated clothing.

INGESTION: If swallowed, call a physician immediately. Remove stomach contents by gastric suction or induce vomiting only as directed by medical personnel. Never give anything by mouth to an unconscious person.

HMIS Rating

Health 3, Flammability 4, Physical Hazard 0, Personal Protection G

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks.

VI. Reactivity Data

STABILITY: STABLE

Hazardous Polymerization: *will not occur*

INCOMPATIBILITY: oxidizing agents, halogens, strong reducing agents and strong bases.

HAZARDOUS DECOMPOSITION PRODUCTS: When heated to decomposition, toxic fumes are formed.

CONDITIONS TO AVOID: Fire, burning, and welding

VII. SPILL OR LEAD PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:

Remove all sources of ignition (flames, hot surfaces and electrical, static or frictional sparks). Avoid breathing vapors. Ventilate area. Use non-sparking tools. Remove with inert absorbent.

WASTE DISPOSAL METHOD: Dispose of in accordance with local, state, and federal regulations.

VIII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: For casual use none required. To avoid breathing vapors or spray mist, open windows and doors or use other means to ensure fresh air entry during application and drying. If you experience eye watering, headaches or dizziness, increase fresh air or wear respiratory protection (NIOSH/MSHA approved) or leave the area. Avoid contact with eyes, skin and clothing.

VENTILATION: Provide general dilution or local exhaust ventilation in volume and pattern to keep TLV and LEL of most hazardous ingredients in Section II, below acceptable limits.

PROTECTIVE GLOVES: Permeation resistant gloves (butyl rubber, nitrile rubber) should be used. Cover as much of the exposed skin area as possible with appropriate clothing.

EYE PROTECTION: Splash proof eye and goggles. In emergency situations, use eye goggles with a full-face shield.

OTHER PROTECTIVE EQUIPMENT: Protective clothing such as coveralls or lab coats must be worn

HYGENIC PRACTICES: See section V

IX. SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING:

Do not store above 120 degrees F. Store large quantities in buildings designed and protected for storage of NFPA Class 1A flammable liquids.

OTHER PRECAUTIONS: Do not spray in eyes. Do not puncture or incrate cans. Do not stick a pin or nay sharp objects into opening of can. Finger must not protrude over spray button.

LIST OF HAZARDOUS AIR POLLUTANTS SUBJECT TO THE PROVISIONS OF THE CLEAN AIR ACT, TITLE I SECTION 112 'National Emission Standards for Hazardous Air Pollutants':

Ingredient	CAS#	Wt% of HAPS In product	Pounds HAPS/ Gal product
Xylene	1330-20-7	15.0 %	1.0
Ethyl Benzene	100-41-4	3.4 %	0.2

X. STABILITY & REACTIVITY

Not available at this time

XI. TOXICOLOGICAL INFORMATION

No information available at this time

XII. ECOLOGICAL INFORMATION

No information available at this time.

XIII. DISPOSAL INFORMATION

Disposal should be made in accordance with local, state and federal regulations.

XIV. TRANSPORTATION INFORMATION

US Department of Transportation

Proper shipping name: Aerosols Flammable

UN ID Number: UN1950

International Air Transport Association

Proper Shipping name: Aerosols, Flammable

Hazardous Class: 2.1

UN ID Number: UN1950

International Maritime Organization

Proper Shipping name: Aerosols, Flammable

Hazardous Class: 2

UN ID Number: UN1950

Please consult 49CFR to ensure that shipments comply with regulations. Exceptions may be applied and can be found in 49CFR subchapter C.

Material Safety Data Sheet**1. MATERIAL AND COMPANY IDENTIFICATION**

Material Name : Shell Omala S2 G 220
Uses : Gear lubricant.

Manufacturer/Supplier : SOPUS Products
PO BOX 4427
Houston, TX 77210-4427
USA

SDS Request : 877-276-7285

Emergency Telephone Number
Spill Information : 877-242-7400
Health Information : 877-504-9351

2. COMPOSITION/INFORMATION ON INGREDIENTS

Highly refined mineral oils and additives.

The highly refined mineral oil contains <3% (w/w) DMSO-extract, according to IP346.

3. HAZARDS IDENTIFICATION

Emergency Overview	
Appearance and Odour	: Brown. Liquid at room temperature. Slight hydrocarbon.
Health Hazards	: Not classified as dangerous for supply or conveyance.
Safety Hazards	: Not classified as flammable but will burn.
Environmental Hazards	: Not classified as dangerous for the environment.

Health Hazards : Not expected to be a health hazard when used under normal conditions.

**Health Hazards
Inhalation** : Under normal conditions of use, this is not expected to be a primary route of exposure.

Skin Contact : Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.

Eye Contact : May cause slight irritation to eyes.

Ingestion : Low toxicity if swallowed.

Other Information : Used oil may contain harmful impurities.

Signs and Symptoms : Oil acne/folliculitis signs and symptoms may include formation of black pustules and spots on the skin of exposed areas. Ingestion may result in nausea, vomiting and/or diarrhea.

Aggravated Medical Conditions : Pre-existing medical conditions of the following organ(s) or organ system(s) may be aggravated by exposure to this material: Skin.

Environmental Hazards : Not classified as dangerous for the environment.

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Additional Information : Under normal conditions of use or in a foreseeable emergency, this product does not meet the definition of a hazardous chemical when evaluated according to the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

4. FIRST AID MEASURES

General Information : Not expected to be a health hazard when used under normal conditions.

Inhalation : No treatment necessary under normal conditions of use. If symptoms persist, obtain medical advice.

Skin Contact : Remove contaminated clothing. Flush exposed area with water and follow by washing with soap if available. If persistent irritation occurs, obtain medical attention.

Eye Contact : Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.

Ingestion : In general no treatment is necessary unless large quantities are swallowed, however, get medical advice.

Advice to Physician : Treat symptomatically.

5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

Flash point : Typical 240 °C / 464 °F (COC)

Upper / lower : Typical 1 - 10 %(V)(based on mineral oil)

Flammability or Explosion limits

Auto ignition temperature : > 320 °C / 608 °F

Specific Hazards : Hazardous combustion products may include: A complex mixture of airborne solid and liquid particulates and gases (smoke). Carbon monoxide. Unidentified organic and inorganic compounds.

Suitable Extinguishing Media : Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.

Unsuitable Extinguishing Media : Do not use water in a jet.

Protective Equipment for Firefighters : Proper protective equipment including breathing apparatus must be worn when approaching a fire in a confined space.

6. ACCIDENTAL RELEASE MEASURES

Avoid contact with spilled or released material. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. See Chapter 13 for information on disposal. Observe the relevant local and international regulations.

Protective measures : Avoid contact with skin and eyes. Use appropriate containment to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers.

Clean Up Methods : Slippery when spilt. Avoid accidents, clean up immediately.

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Prevent from spreading by making a barrier with sand, earth or other containment material. Reclaim liquid directly or in an absorbent. Soak up residue with an absorbent such as clay, sand or other suitable material and dispose of properly.

Additional Advice : Local authorities should be advised if significant spillages cannot be contained.

7. HANDLING AND STORAGE

General Precautions : Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.

Handling : Avoid prolonged or repeated contact with skin. Avoid inhaling vapour and/or mists. When handling product in drums, safety footwear should be worn and proper handling equipment should be used. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires.

Storage : Keep container tightly closed and in a cool, well-ventilated place. Use properly labelled and closeable containers. Store at ambient temperature.

Product Transfer : This material has the potential to be a static accumulator. Proper grounding and bonding procedures should be used during all bulk transfer operations.

Recommended Materials : For containers or container linings, use mild steel or high density polyethylene.

Unsuitable Materials : PVC.

Additional Information : Polyethylene containers should not be exposed to high temperatures because of possible risk of distortion.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational Exposure Limits

Material	Source	Type	ppm	mg/m3	Notation
Oil mist, mineral	ACGIH	TWA(Inhalable fraction.)		5 mg/m3	
Oil mist, mineral	OSHA Z1	PEL(Mist.)		5 mg/m3	

Biological Exposure Index (BEI)

No biological limit allocated.

Exposure Controls : The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls

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based on a risk assessment of local circumstances. Appropriate measures include: Adequate ventilation to control airborne concentrations. Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated.

- Personal Protective Equipment** : Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.
- Respiratory Protection** : No respiratory protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid breathing of material. If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter. Select a filter suitable for combined particulate/organic gases and vapours [boiling point >65°C(149 °F)].
- Hand Protection** : Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection: PVC, neoprene or nitrile rubber gloves. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended. For continuous contact we recommend gloves with breakthrough time of more than 240 minutes with preference for > 480 minutes where suitable gloves can be identified. For short-term/splash protection we recommend the same, but recognize that suitable gloves offering this level of protection may not be available and in this case a lower breakthrough time may be acceptable so long as appropriate maintenance and replacement regimes are followed. Glove thickness is not a good predictor of glove resistance to a chemical as it is dependent on the exact composition of the glove material.
- Eye Protection** : Wear safety glasses or full face shield if splashes are likely to occur.
- Protective Clothing** : Skin protection not ordinarily required beyond standard issue work clothes.
- Monitoring Methods** : Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate. Validated exposure measurement methods should be applied by a competent person and samples

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analyzed by an accredited laboratory. Examples of sources of recommended exposure measurement methods are given below or contact the supplier. Further national methods may be available.

National Institute of Occupational Safety and Health (NIOSH), USA: Manual of Analytical Methods <http://www.cdc.gov/niosh/>
Occupational Safety and Health Administration (OSHA), USA: Sampling and Analytical Methods <http://www.osha.gov/>
Health and Safety Executive (HSE), UK: Methods for the Determination of Hazardous Substances <http://www.hse.gov.uk/>
Institut für Arbeitsschutz Deutschen Gesetzlichen Unfallversicherung (IFA), Germany. <http://www.dguv.de/inhalt/index.jsp>
L'Institut National de Recherche et de Sécurité, (INRS), France <http://www.inrs.fr/accueil>

Environmental Exposure Controls : Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Brown. Liquid at room temperature.
Odour : Slight hydrocarbon.
pH : Not applicable.
Initial Boiling Point and Boiling Range : > 280 °C / 536 °F estimated value(s)
Pour point : Typical -18 °C / 0 °F
Flash point : Typical 240 °C / 464 °F (COC)
Upper / lower Flammability or Explosion limits : Typical 1 - 10 %(V) (based on mineral oil)
Auto-ignition temperature : > 320 °C / 608 °F
Vapour pressure : < 0.5 Pa at 20 °C / 68 °F (estimated value(s))
Specific gravity : Typical 0.899 at 15 °C / 59 °F

Density : Typical 899 kg/m³ at 15 °C / 59 °F
Water solubility : Negligible.
n-octanol/water partition coefficient (log Pow) : > 6 (based on information on similar products)
Kinematic viscosity : Typical 220 mm²/s at 40 °C / 104 °F
Vapour density (air=1) : > 1 (estimated value(s))
Electrical conductivity : This material is not expected to be a static accumulator.
Evaporation rate (nBuAc=1) : Data not available

10. STABILITY AND REACTIVITY

Stability : Stable.
Conditions to Avoid : Extremes of temperature and direct sunlight.
Materials to Avoid : Strong oxidizing agents.
Hazardous Decomposition : Hazardous decomposition products are not expected to form

Material Safety Data Sheet**Products** during normal storage.**11. TOXICOLOGICAL INFORMATION**

- Basis for Assessment** : Information given is based on data on the components and the toxicology of similar products. Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).
- Acute Oral Toxicity** : Expected to be of low toxicity: LD50 > 5000 mg/kg , Rat
- Acute Dermal Toxicity** : Expected to be of low toxicity: LD50 > 5000 mg/kg , Rabbit
- Acute Inhalation Toxicity** : Not considered to be an inhalation hazard under normal conditions of use.
- Skin Irritation** : Expected to be slightly irritating.
- Eye Irritation** : Expected to be slightly irritating.
- Respiratory Irritation** : Inhalation of vapours or mists may cause irritation.
- Sensitisation** : Not expected to be a skin sensitiser.
- Repeated Dose Toxicity** : Not expected to be a hazard.
- Mutagenicity** : Not considered a mutagenic hazard.
- Carcinogenicity** : Not expected to be carcinogenic. Product contains mineral oils of types shown to be non-carcinogenic in animal skin-painting studies. Highly refined mineral oils are not classified as carcinogenic by the International Agency for Research on Cancer (IARC).

Material	Carcinogenicity Classification
Highly refined mineral oil (IP346 <3%)	ACGIH Group A4: Not classifiable as a human carcinogen.
Highly refined mineral oil (IP346 <3%)	IARC 3: Not classifiable as to carcinogenicity to humans.
Highly refined mineral oil (IP346 <3%)	GHS / CLP: No carcinogenicity classification

- Reproductive and Developmental Toxicity** : Not expected to be a hazard.
- Additional Information** : Used oils may contain harmful impurities that have accumulated during use. The concentration of such impurities will depend on use and they may present risks to health and the environment on disposal. ALL used oil should be handled with caution and skin contact avoided as far as possible.

12. ECOLOGICAL INFORMATION

Ecotoxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the ecotoxicology of similar products. Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).

- Acute Toxicity** : Poorly soluble mixture. May cause physical fouling of aquatic

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organisms. Expected to be practically non toxic: LL/EL/IL50 > 100 mg/l (to aquatic organisms) LL/EL50 expressed as the nominal amount of product required to prepare aqueous test extract. Mineral oil is not expected to cause any chronic effects to aquatic organisms at concentrations less than 1 mg/l.

- Mobility** : Liquid under most environmental conditions. If it enters soil, it will adsorb to soil particles and will not be mobile. Floats on water.
- Persistence/degradability** : Expected to be not readily biodegradable. Major constituents are expected to be inherently biodegradable, but the product contains components that may persist in the environment.
- Bioaccumulation** : Contains components with the potential to bioaccumulate.
- Other Adverse Effects** : Product is a mixture of non-volatile components, which are not expected to be released to air in any significant quantities. Not expected to have ozone depletion potential, photochemical ozone creation potential or global warming potential.

13. DISPOSAL CONSIDERATIONS

- Material Disposal** : Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations. Do not dispose into the environment, in drains or in water courses.
- Container Disposal** : Dispose in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor should be established beforehand.
- Local Legislation** : Disposal should be in accordance with applicable regional, national, and local laws and regulations.

14. TRANSPORT INFORMATION**US Department of Transportation Classification (49CFR)**

This material is not subject to DOT regulations under 49 CFR Parts 171-180.

IMDG

This material is not classified as dangerous under IMDG regulations.

IATA (Country variations may apply)

This material is either not classified as dangerous under IATA regulations or needs to follow country specific requirements.

15. REGULATORY INFORMATION

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

Material Safety Data Sheet**Federal Regulatory Status****Notification Status**

EINECS	All components listed or polymer exempt.
TSCA	All components listed.
DSL	All components listed.

Shell classifies this material as an "oil" under the CERCLA Petroleum Exclusion, therefore releases to the environment are not reportable under CERCLA.

SARA Hazard Categories (311/312)

No SARA 311/312 Hazards.

State Regulatory Status**California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)**

This material does not contain any chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

16. OTHER INFORMATION

NFPA Rating (Health, Fire, Reactivity)	: 0, 1, 0
SDS Version Number	: 1.2
SDS Effective Date	: 02/06/2013
SDS Revisions	: A vertical bar () in the left margin indicates an amendment from the previous version.
SDS Regulation	: The content and format of this MSDS is in accordance with the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
SDS Distribution	: The information in this document should be made available to all who may handle the product.
Disclaimer	: The information contained herein is based on our current knowledge of the underlying data and is intended to describe

Shell Omala S2 G 220

MSDS# 17948

Version 1.2

Effective Date 02/06/2013

According to OSHA Hazard Communication Standard, 29 CFR
1910.1200

Material Safety Data Sheet

the product for the purpose of health, safety and environmental requirements only. No warranty or guarantee is expressed or implied regarding the accuracy of these data or the results to be obtained from the use of the product.

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: MOBILGREASE XHP 222 SPECIAL
Product Description: Base Oil and Additives
Product Code: 2015A0202531, 530550-00, 97G870
Intended Use: Grease

COMPANY IDENTIFICATION

Supplier: EXXON MOBIL CORPORATION
3225 GALLOWS RD.
FAIRFAX, VA. 22037 USA

24 Hour Health Emergency: 609-737-4411
Transportation Emergency Phone: 800-424-9300
ExxonMobil Transportation No.: 281-834-3296
Product Technical Information: 800-662-4525, 800-947-9147
MSDS Internet Address: <http://www.exxon.com>, <http://www.mobil.com>

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

Reportable Hazardous Substance(s) or Complex Substance(s)

Name	CAS#	Concentration*
PHOSPHORODITHOIC ACID, O,O-DI C1-14-ALKYL ESTERS, ZINC SALTS (2:1) (ZDDP)	68649-42-3	< 2.5%

* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

SECTION 3 HAZARDS IDENTIFICATION

This material is not considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

POTENTIAL HEALTH EFFECTS

Low order of toxicity. Excessive exposure may result in eye, skin, or respiratory irritation. High-pressure injection under skin may cause serious damage.

NFPA Hazard ID: Health: 0 Flammability: 1 Reactivity: 0
HMIS Hazard ID: Health: 0 Flammability: 1 Reactivity: 0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 4 FIRST AID MEASURES

Product Name: MOBILGREASE XHP 222 SPECIAL

Revision Date: 15Apr2009

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INHALATION

Under normal conditions of intended use, this material is not expected to be an inhalation hazard.

SKIN CONTACT

Wash contact areas with soap and water. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

First aid is normally not required. Seek medical attention if discomfort occurs.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO₂) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Hazardous Combustion Products: Smoke, Fume, Aldehydes, Sulfur oxides, Incomplete combustion products, Oxides of carbon

FLAMMABILITY PROPERTIES

Flash Point [Method]: >204C (400F) [EST. FOR OIL, ASTM D-92 (COC)]

Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D

Autoignition Temperature: N/D

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The National Response Center can be reached at (800)424-8802.

SPILL MANAGEMENT

Land Spill: Scrape up spilled material with shovels into a suitable container for recycle or disposal.

Water Spill: Stop leak if you can do it without risk. Confine the spill immediately with booms. Warn other shipping. Skim from surface.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7	HANDLING AND STORAGE
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HANDLING

Prevent small spills and leakage to avoid slip hazard.

Static Accumulator: This material is not a static accumulator.

STORAGE

Do not store in open or unlabeled containers.

SECTION 8	EXPOSURE CONTROLS / PERSONAL PROTECTION
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EXPOSURE LIMIT VALUES

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions.

Control measures to consider:

No special requirements under ordinary conditions of use and with adequate ventilation.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

No protection is ordinarily required under normal conditions of use and with adequate ventilation.

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For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

No protection is ordinarily required under normal conditions of use.

Eye Protection: If contact is likely, safety glasses with side shields are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

No skin protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid skin contact.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS

See Sections 6, 7, 12, 13.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Typical physical and chemical properties are given below. Consult the Supplier in Section 1 for additional data.

GENERAL INFORMATION

Physical State: Solid
Form: Semi-fluid
Color: Dark Gray
Odor: Characteristic
Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 C): 0.914
Flash Point [Method]: >204C (400F) [EST. FOR OIL, ASTM D-92 (COC)]
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
Auto-ignition Temperature: N/D
Boiling Point / Range: > 316C (600F)
Vapor Density (Air = 1): N/D
Vapor Pressure: < 0.013 kPa (0.1 mm Hg) at 20 C
Evaporation Rate (n-butyl acetate = 1): N/D
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): > 3.5
Solubility in Water: Negligible

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Viscosity: 220 cSt (220 mm²/sec) at 40 C | >16 cSt (16 mm²/sec) at 100C

Oxidizing Properties: See Sections 3, 15, 16.

OTHER INFORMATION

Freezing Point: N/D

Melting Point: >260°C (500°F)

DMSO Extract (mineral oil only), IP-346: < 3 %wt

NOTE: Most physical properties above are for the oil component in the material.

SECTION 10

STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Excessive heat. High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11

TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks
Inhalation	
Toxicity: No end point data.	Minimally Toxic. Based on assessment of the components.
Irritation: No end point data.	Negligible hazard at ambient/normal handling temperatures. Based on assessment of the components.
Ingestion	
Toxicity (Rat): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Skin	
Toxicity (Rabbit): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Irritation (Rabbit): Data available.	Negligible irritation to skin at ambient temperatures. Based on assessment of the components.
Eye	
Irritation (Rabbit): Data available.	May cause mild, short-lasting discomfort to eyes. Based on assessment of the components.

CHRONIC/OTHER EFFECTS

Contains:

Base oil severely refined: Not carcinogenic in animal studies. Representative material passes IP-346, Modified Ames test, and/or other screening tests. Dermal and inhalation studies showed minimal effects; lung non-specific infiltration of immune cells, oil deposition and minimal granuloma formation. Not sensitizing in test animals.

Additional information is available by request.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--
1 = NTP CARC 3 = IARC 1 5 = IARC 2B
2 = NTP SUS 4 = IARC 2A 6 = OSHA CARC

SECTION 12	ECOLOGICAL INFORMATION
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The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.

MOBILITY

Base oil component -- Low solubility and floats and is expected to migrate from water to the land.
Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Base oil component -- Expected to be inherently biodegradable

BIOACCUMULATION POTENTIAL

Base oil component -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

SECTION 13	DISPOSAL CONSIDERATIONS
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Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

REGULATORY DISPOSAL INFORMATION

RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrosivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken.

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for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14	TRANSPORT INFORMATION
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LAND (DOT) : Not Regulated for Land Transport

LAND (TDG) : Not Regulated for Land Transport

SEA (IMDG) : Not Regulated for Sea Transport according to IMDG-Code

AIR (IATA) : Not Regulated for Air Transport

SECTION 15	REGULATORY INFORMATION
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OSHA HAZARD COMMUNICATION STANDARD: When used for its intended purposes, this material is not classified as hazardous in accordance with OSHA 29 CFR 1910.1200.

NATIONAL CHEMICAL INVENTORY LISTING: AICS, IECSC, EINECS, ENCS, PICCS, TSCA

Special Cases:

Inventory	Status
KECI	Restrictions Apply
NDSL	Restrictions Apply

EPCRA: This material contains no extremely hazardous substances.

SARA (311/312) REPORTABLE HAZARD CATEGORIES: None.

SARA (313) TOXIC RELEASE INVENTORY:

Chemical Name	CAS Number	Typical Value
PHOSPHORODITHOIC ACID, O,O-DI C1-14-ALKYL ESTERS, ZINC SALTS (2:1) (ZDDP)	68649-42-3	< 2.5%
PHOSPHORODITHOIC ACID, O,O-DI C1-14-ALKYL ESTERS, ZINC SALTS (2:1) (ZDDP)	68649-42-3	< 2.5%

The Following Ingredients are Cited on the Lists Below:

Chemical Name	CAS Number	List Citations
NAPHTHENIC ACIDS, ZINC	12001-85-3	15

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SALTS		
PHOSPHORODITHOIC ACID, O,O-DI C1-14-ALKYL ESTERS, ZINC SALTS (2:1) (ZDDP)	68649-42-3	13, 15, 17
ZINC NEODECANOATE	27253-29-8	15

--REGULATORY LISTS SEARCHED--

- | | | | |
|---------------|------------------|-------------------|-------------|
| 1 = ACGIH ALL | 6 = TSCA 5a2 | 11 = CA P65 REPRO | 16 = MN RTK |
| 2 = ACGIH A1 | 7 = TSCA 5e | 12 = CA RTK | 17 = NJ RTK |
| 3 = ACGIH A2 | 8 = TSCA 6 | 13 = IL RTK | 18 = PA RTK |
| 4 = OSHA Z | 9 = TSCA 12b | 14 = LA RTK | 19 = RI RTK |
| 5 = TSCA 4 | 10 = CA P65 CARC | 15 = MI 293 | |

Code key: CARC=Carcinogen; REPRO=Reproductive

SECTION 16	OTHER INFORMATION
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N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:

Revision Changes:

- Section 06: Notification Procedures - Header was modified.
- Section 01: Product Code was modified.
- Section 13: Empty Container Warning was modified.
- Section 08: Hand Protection was modified.
- Section 11: Dermal Lethality Test Data was modified.
- Section 11: Oral Lethality Test Data was modified.
- Section 11: Inhalation Lethality Test Data was modified.
- Section 05: Hazardous Combustion Products was modified.
- Section 15: List Citations Table was modified.
- Section 15: List Citation Table - Header was modified.
- Section 15: SARA (313) TOXIC RELEASE INVENTORY - Table was modified.
- Section 15: National Chemical Inventory Listing was modified.
- Section 16: Code to MHCs was modified. Section 15: Special Cases Table was modified. Section 06: Notification Procedures was modified.
- Section 01: Company Contact Methods Sorted by Priority was modified.
- Section 15: TSCA Class 2 Statement was deleted.

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Internal Use Only

MHC: 0B, 0B, 0, 0, 0, 0

PPEC: A

DGN: 2006163XUS (550276)

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