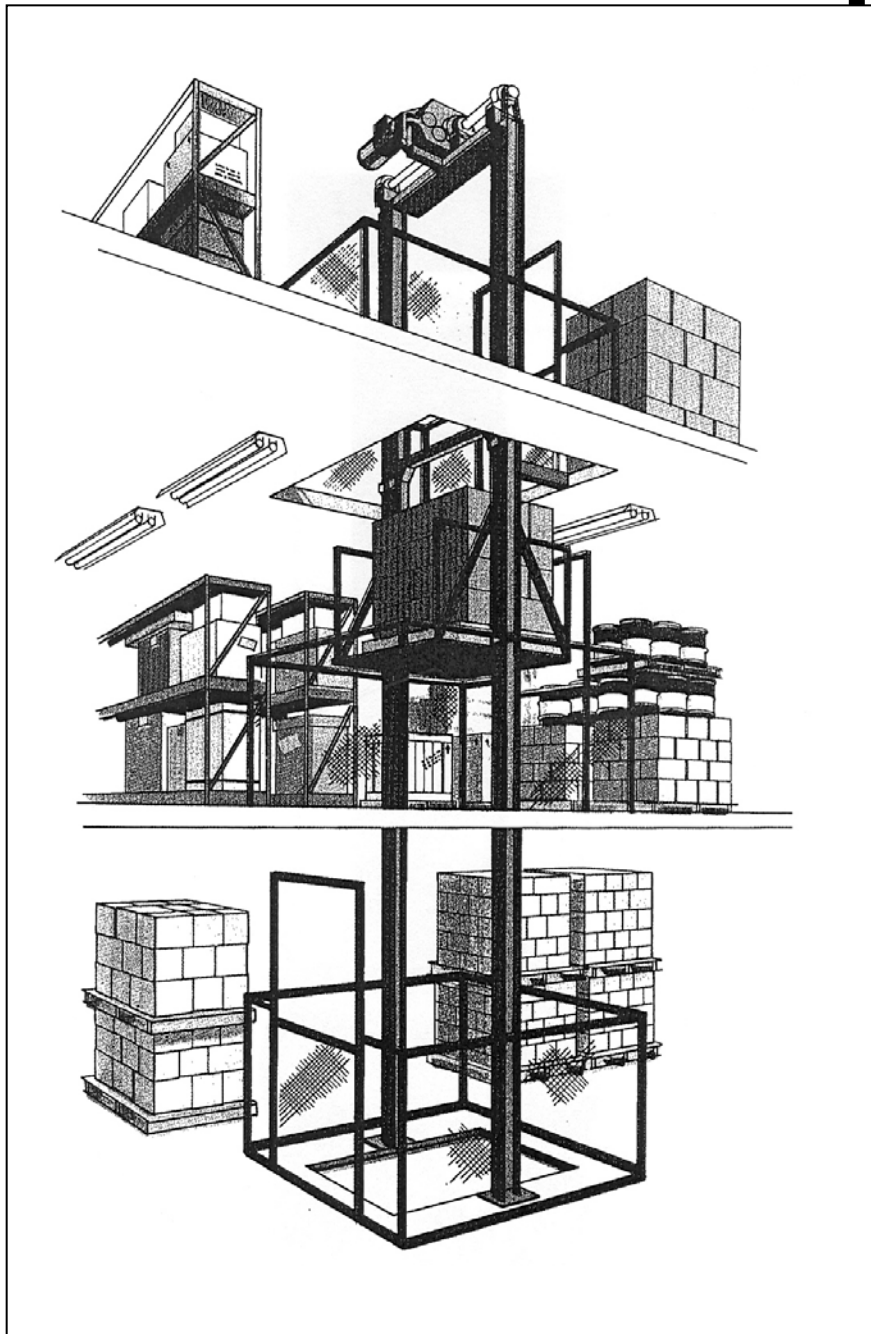


PFLOW VERTICAL LIFTS

The Nation's Largest Manufacturer of Vertical Lifts

PFlow
Industries, Inc.



MAINTENANCE & OWNER'S MANUAL

SERIES M

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

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DOCUMENTATION

PFlow Industries reserves the right to make changes or improvements to the standard VRC model line at any time.

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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.

Notes

TABLE OF CONTENTS



TABLE OF CONTENTS	1
INTRODUCTION	3
SAFETY	4
Electrical Safety Precautions	5
COMPONENT LOCATION - Straddle	6
COMPONENT LOCATION - Cantilever	7
MECHANICAL OVERVIEW	9
ELECTRICAL OVERVIEW	13
OPERATION	15
SERVICE	
Maintenance Schedule	16
Reducer Information	17
Motor Information	19
Brake Information	21
Safety Cam Inspection	25
TROUBLESHOOTING	26
Instantaneous Trip Current (Overload) Relay (IOL)	28
PARTS	
Recommended Spare Parts Listing - Series M	29
Adjustable Wheelblock Assembly	30
Lower Wheelblock Assembly - Phenolic	31
Upper Wheelblock Assembly - Phenolic	32
Lower Wheelblock Assembly - 5 1/4 Steel Wheel w/Roller Bearing	33
Upper Wheelblock Assembly - 5 1/4 Steel Wheel w/Roller Bearing	34
Lower Wheelblock Assembly - 5 3/8 Steel Wheel w/Roller Bearing	35
Upper Wheelblock Assembly - 5 3/8 Steel Wheel w/Roller Bearing	36
Chain Tensioner Assembly	37
Chain Loop Arrangement	38
Drive Base Assembly	39
Interlocks	41
Gate Status Switch	42
Chain Tensioner Assembly Kit	43
RECOMMENDED STORAGE REQUIREMENTS	45
ELECTRICAL TERMINOLOGY AND APPLICATIONS	46
WARRANTY	48
INSTALLATION QUESTIONNAIRE	49
ACCEPTANCE CERTIFICATION	51
APPENDIX	53
SAFETY DATA SHEETS	
Sherwin Williams, Fast Dry Acrylic Enamel, FDA Pflow Blue VOC	

TABLE OF CONTENTS



Sherwin Williams, Universal Primer, White
Sherwin Williams, Blue Aerosol
Shell Omala S2 G 220
Exxon Mobil - Mobilgrease XHP 222 Special - Grease

INTRODUCTION

Thank you for purchasing a PFLOW INDUSTRIES, INC., Series M, 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 this 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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M 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

Paint overspray on cylinder rod will damage seals and void warranty.

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:

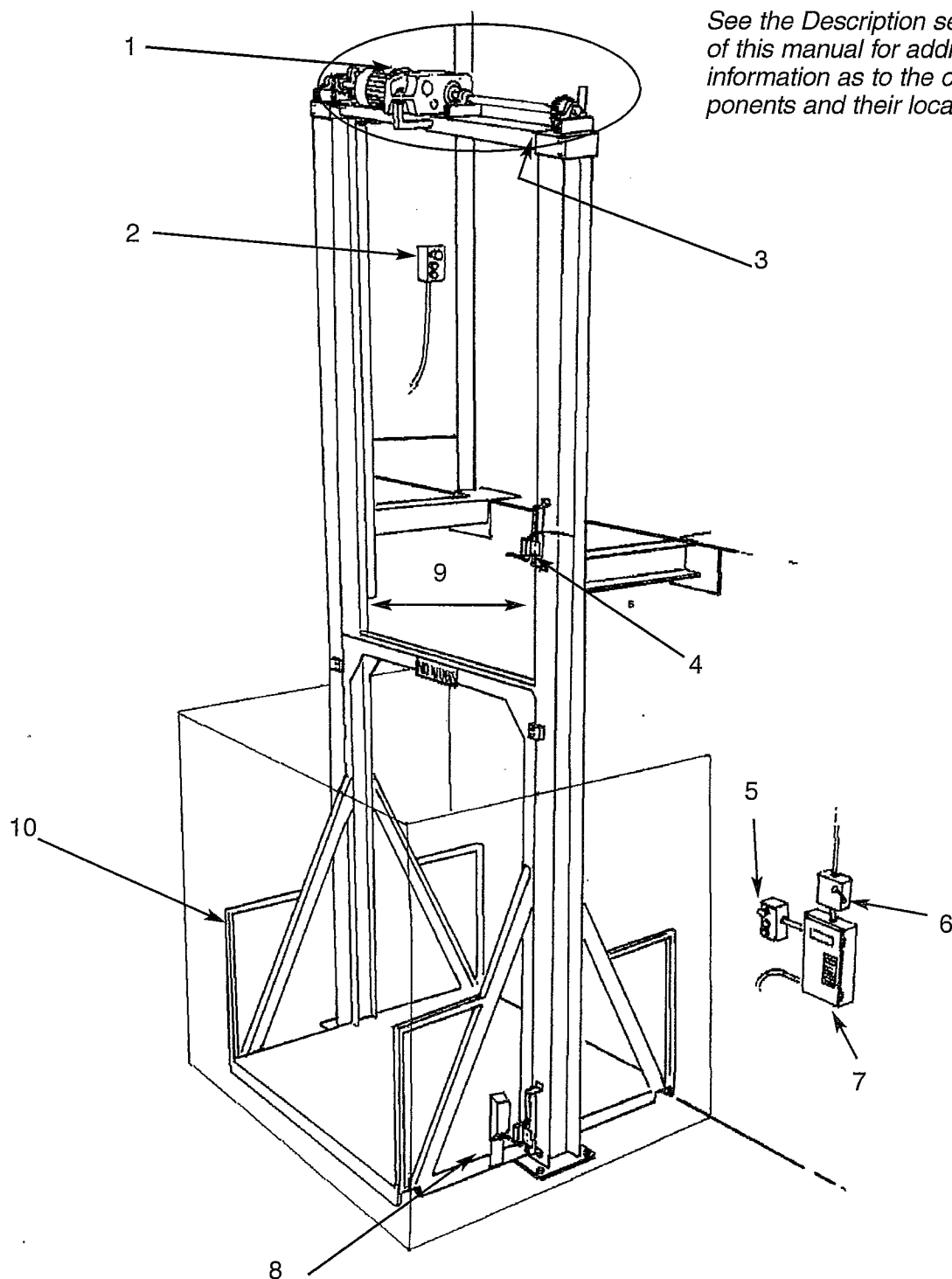
When electrical repair or maintenance work is required that prohibits de-energizing the circuits involved, extreme measures of safety must be used. The work should be accomplished only by well-supervised personnel who are fully aware of the dangers involved. Every care should be taken to protect the 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.

COMPONENT LOCATION - STRADDLE

NOTE

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



PFL-1099-3

- | | |
|-------------------------------------|-----------------------------------|
| 1. Drive Base & Sprocket Assemblies | 6. Fused Disconnect |
| 2. Second Floor Push Button Station | 7. Main Control Panel |
| 3. Overtravel Limit Switch | 8. First Floor Level Limit Switch |
| 4. Second Floor Level Limit Switch | 9. Columns |
| 5. First Floor Push Button Station | 10. Carriage |

Figure 1

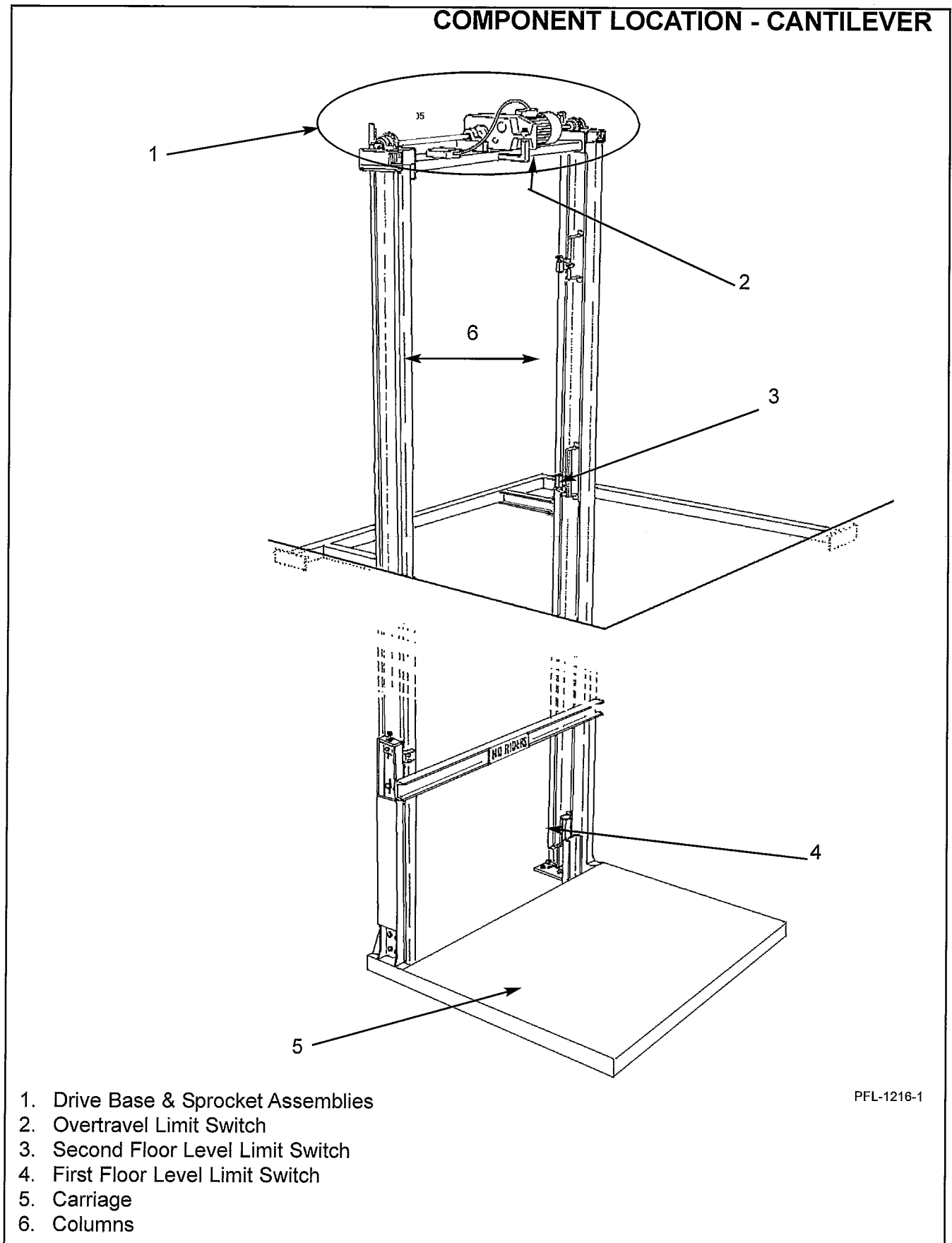


Figure 2

MECHANICAL OVERVIEW

Each Series M Vertical Reciprocating Conveyor (VRC) has a frame, drive base, and two lift sprocket assemblies, a moving platform (carriage), 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 two vertical upright columns that are bolted to the floor at the first level, positioned by the drive base at the top, and braced to the building structure at the upper and intermediate levels.

Each column has an angle welded to one flange of the column to form a track and a chain guard welded to the face of the other flange. The tracks face each other allowing the carriage to ride between them. See Figures 3 and 4.

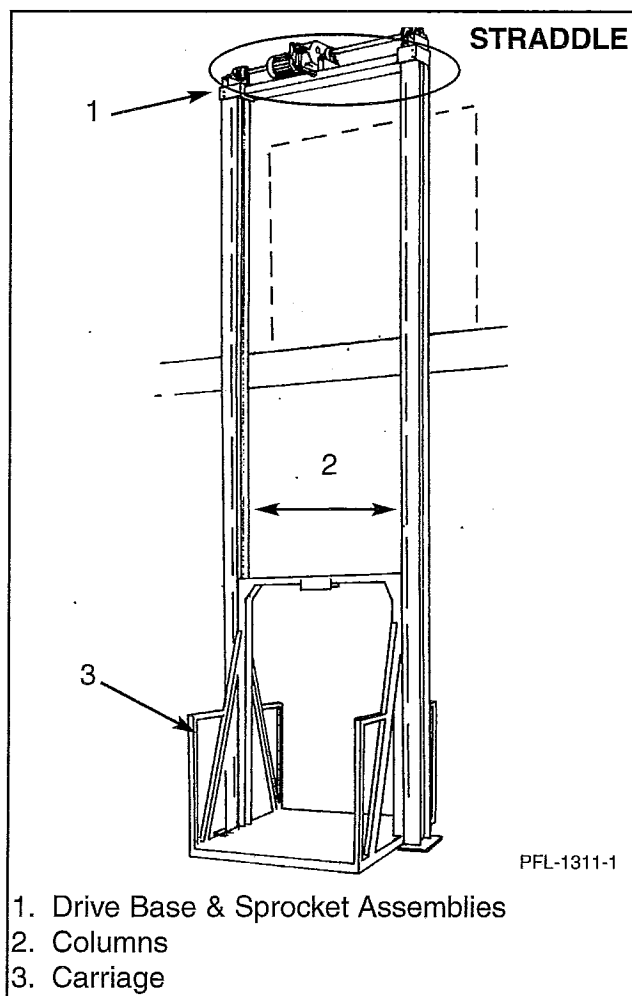


Figure 3

There are two configuration types available for this model. "Straddle" is when a column is located on each side of the carriage. This is shown in Figure 3.

"Cantilever" is when both columns are at the back. An example is shown in Figure 4. There is no difference in the operation or maintenance of the two models.

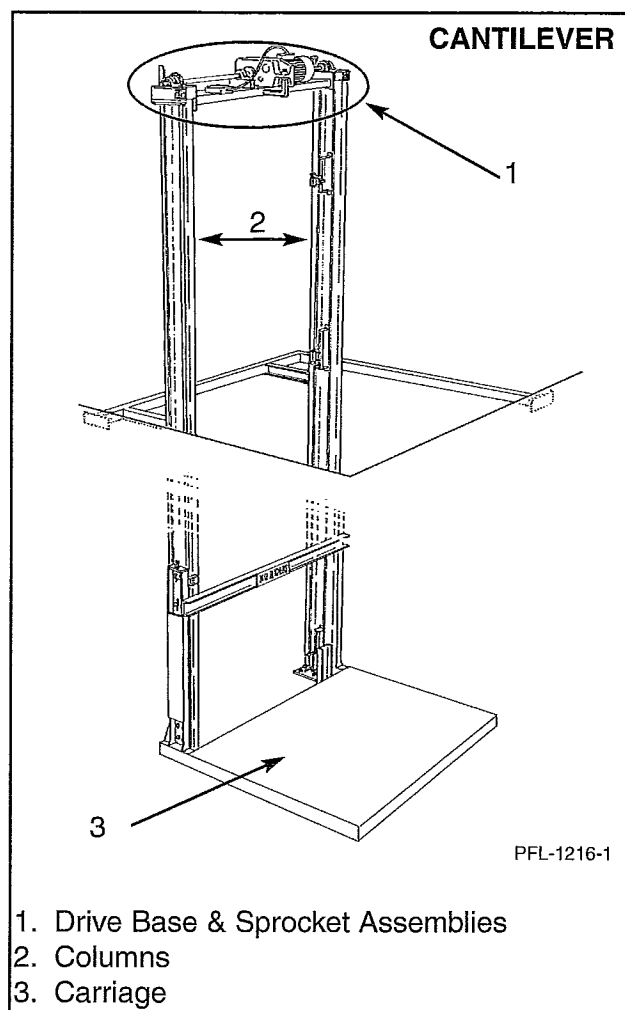


Figure 4

M Series

The **DRIVE BASE** consists of a motor brake, gear reducer, lift sprockets, a drive shaft, bearings, and support structure. Roller lift chains connecting to tensioner chains and chain tensioners complete the components. This assembly is mounted on top of the columns. See Figure 5.

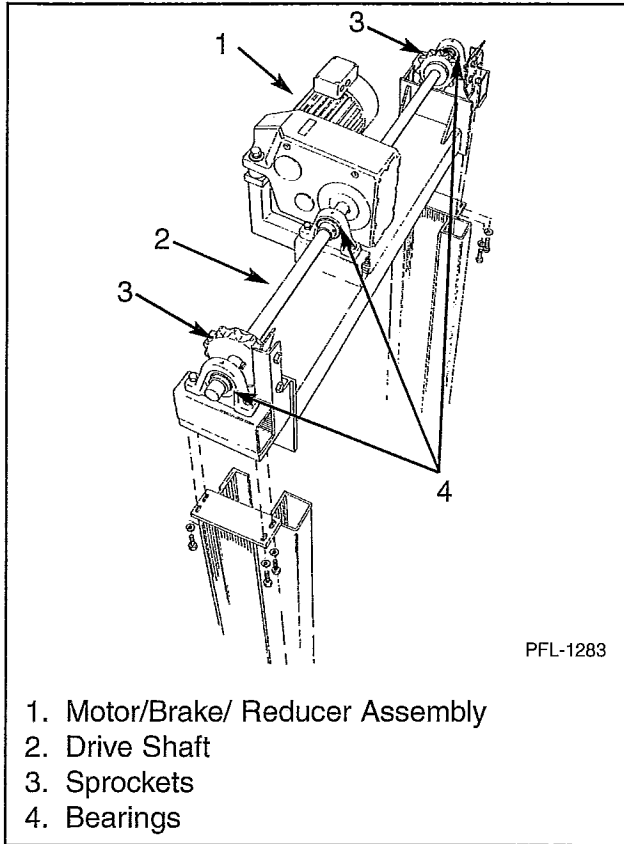


Figure 5

Inside each track, one end of a lift chain connects to a wheelblock assembly bolted to the carriage upright.

The lift chain goes up over the lift sprocket at the top of the column, then proceeds downward through the chain guard (chain tube), and connects to the smaller tensioner chain. See Figure 6.

The tensioner chain then goes around a small sprocket and back up fastening to a bolt on the upper wheelblock.

The tensioner sprocket is spring-loaded by a chain tensioner which maintains tension on the chain/tensioner combination. If the chain is pulled too tight or goes slack, the limit switch is activated to shut off the unit.

The tension is adjusted at the turnbuckle on the chain tensioner assembly.

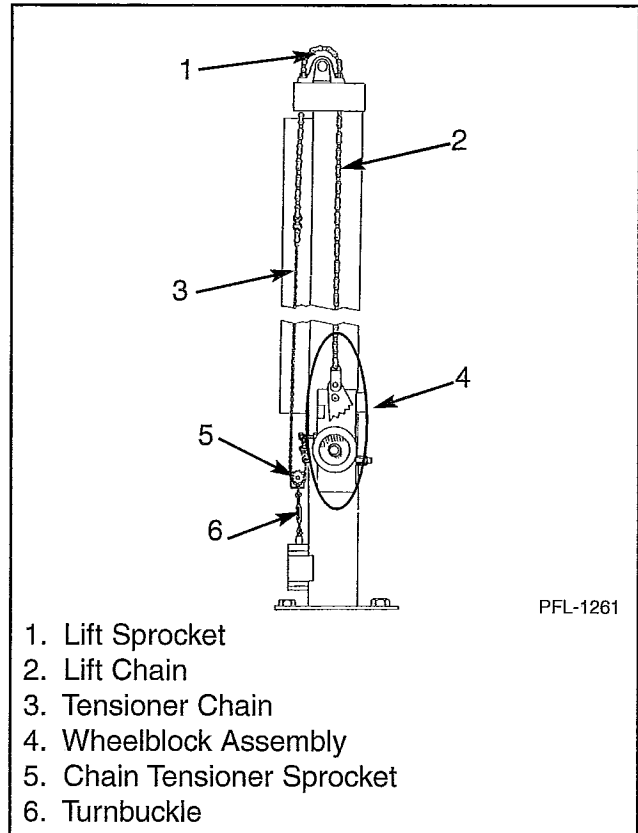


Figure 6

The **CARRIAGE** consists of a deck, uprights, railings or enclosure panels (not shown in overview), and four wheelblocks. See Figure 7.

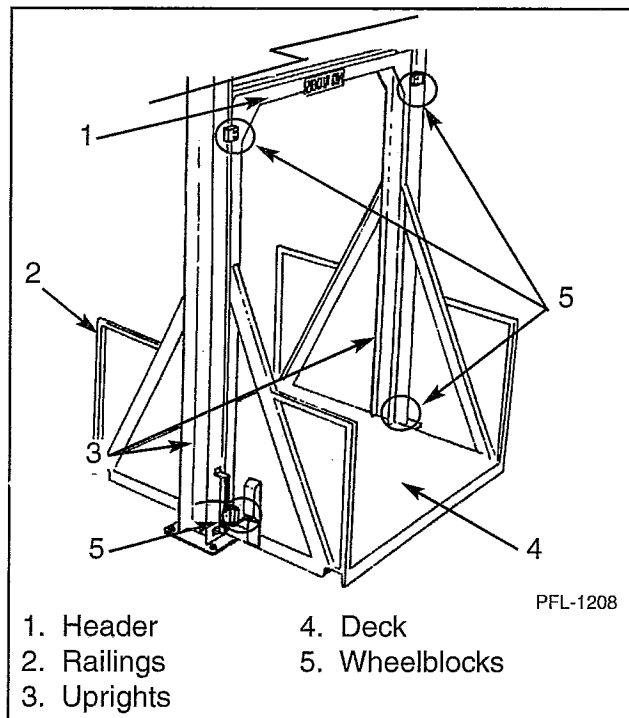


Figure 7

The wheelblocks are bolted to the uprights thus allowing the wheels to ride within the lift columns and guide the carriage during travel. See Figure 8.

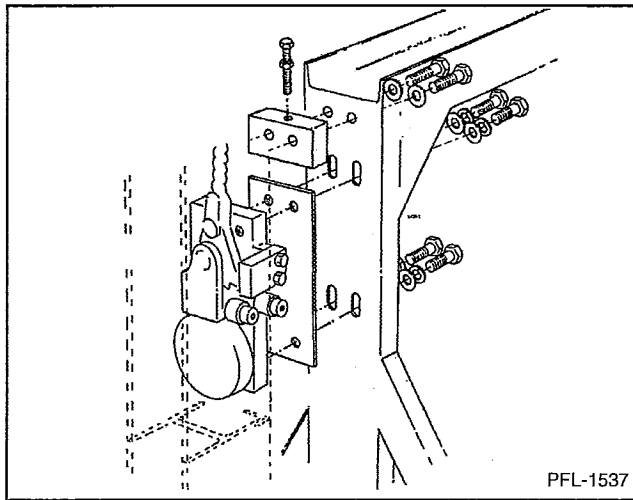


Figure 8

Each **WHEELBLOCK** has a mounting block, a wheel, and two guide rollers. The guide rollers locate the wheelblocks within the track. Each upper wheelblock also has a **SAFETY CAM** with teeth cut into it and a shoe. The shoe fits around the outside of the track while the steel safety cam is pivoted on the mounting block and is spring-loaded. See Figure 9. For an exploded view, see the Parts section of this manual.

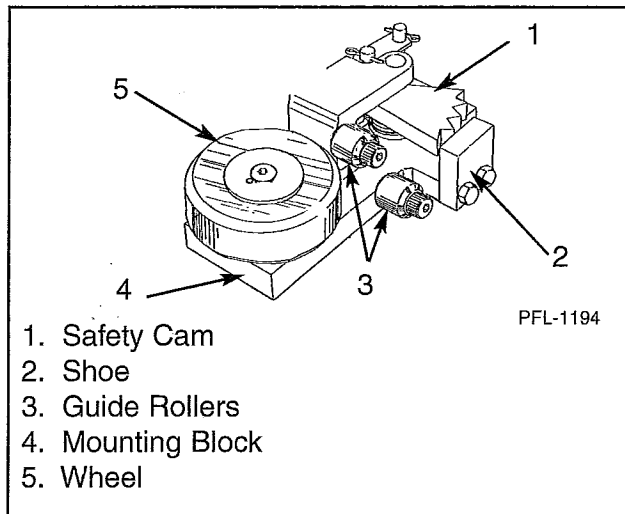


Figure 9

Because the lifting chain connects to this safety cam, all lifting action is through it.

Should the chain break or go slack, the cam will be pivoted by its spring into a jam position with the track to stop the carriage from falling. The guide shoe on the outside of the track helps to wedge the track between it and the cam teeth. See Figure 10.

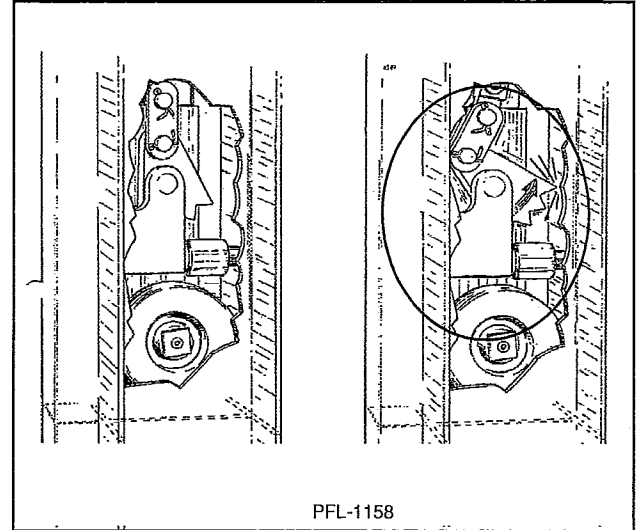


Figure 10

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 11.

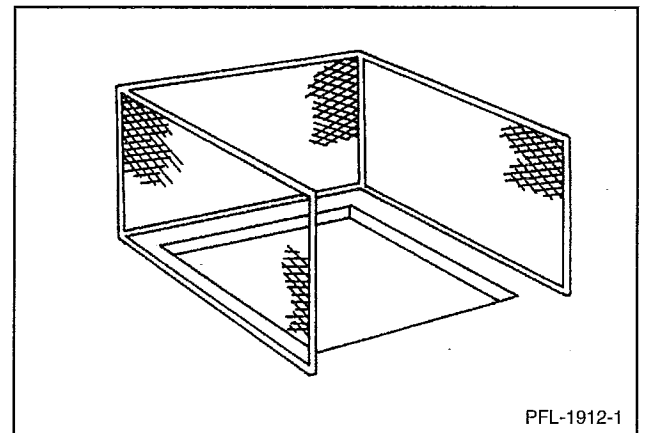


Figure 11

The panels are manufactured of 1-1/2" angle iron frames and 18-gauge flattened expanded metal which will reject a ball 1/2" in diameter. Our standard panels are 8' tall.

M Series

A safety **GATE** or door must be provided at each opening in the lift area at each level. The gate must be interlocked both mechanically and electrically with the operation of the unit. This prevents movement of the platform when a gate is open and the opening of a gate when the lift is not present at that level. See Figure 12.

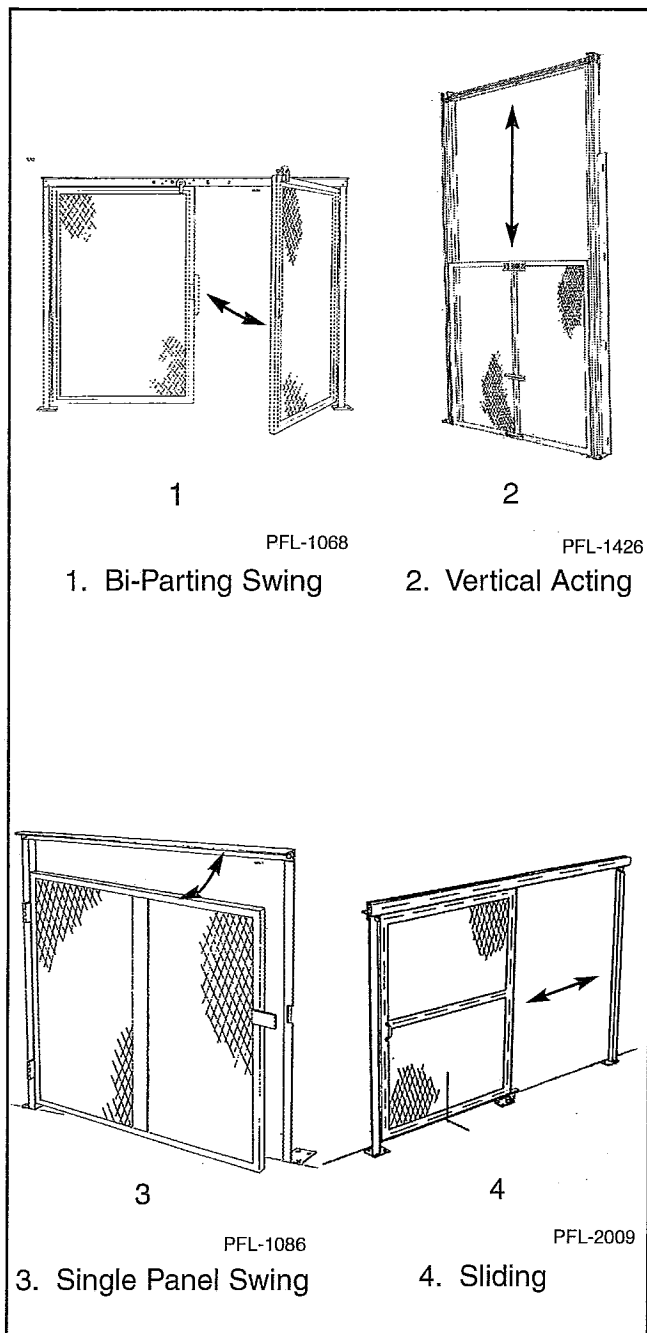


Figure 12

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 13.

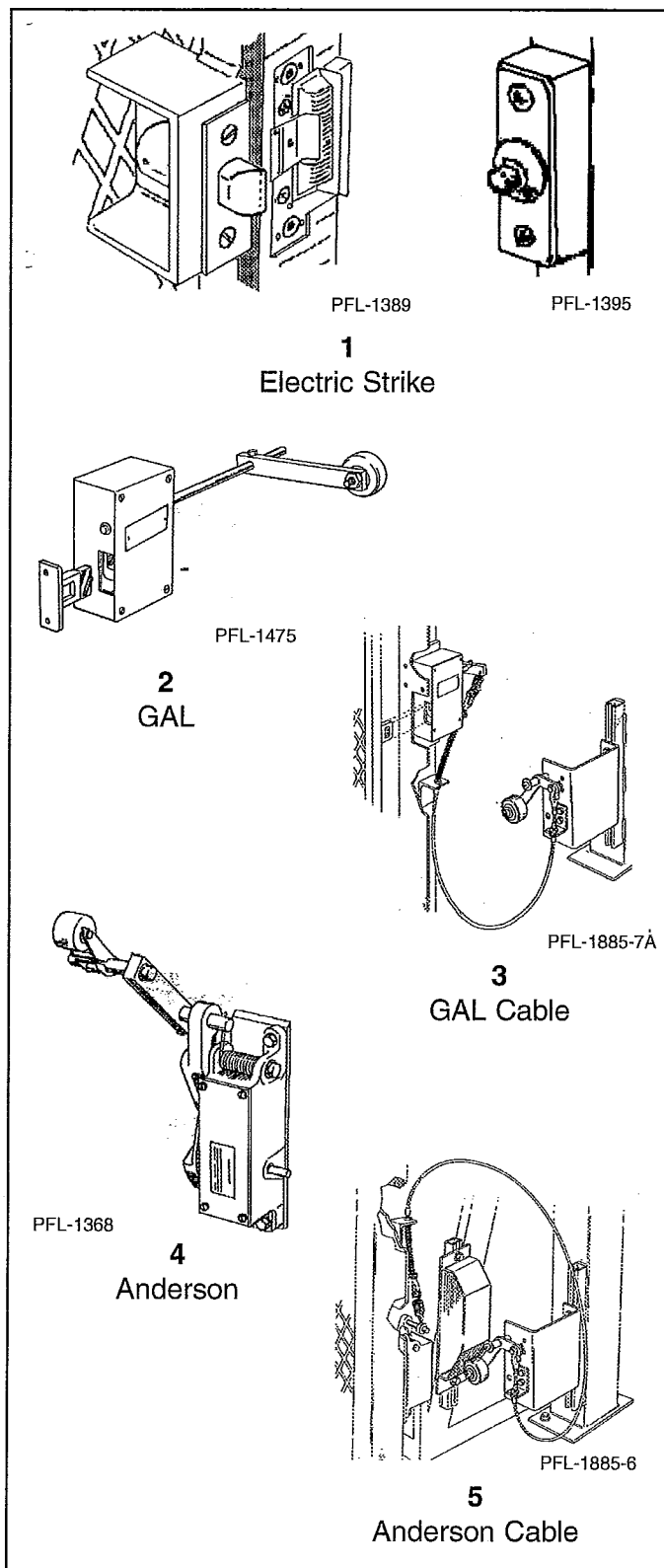


Figure 13

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. A copy of the schematic can be found in a manila envelope in the parts crate.

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.

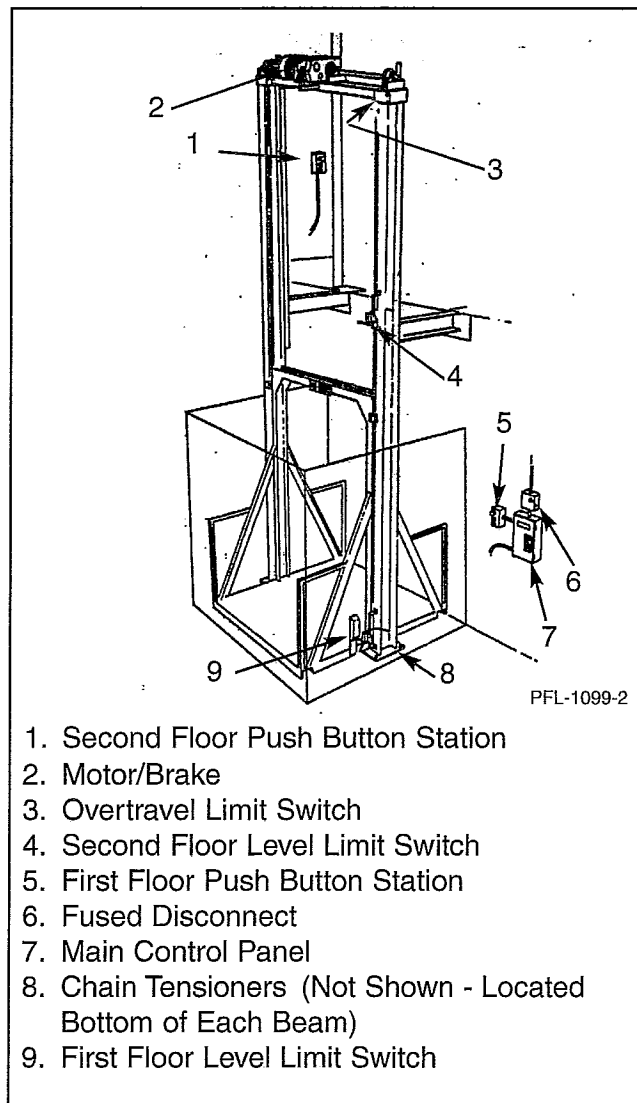


Figure 14

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 will have the brake prewired to the motor so that only the motor need be wired. However, non-standard assemblies may be supplied and will require separate field wiring of these components.

There are five **CONTROL SWITCHES** incorporated into a standard two-level unit: one at each level to stop the carriage, one overtravel, two chain tensioner. 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 cannot hang over the edge or sides of the carriage.
- The load must be within the specified weight limit.

1. When the UP button at the upper push button station is pressed (Figure 15), the control circuit to the motor starter (motor contactor) is completed. The coil of the motor starter (Figure 16) magnetically closes the high voltage contacts completing the power circuit to the motor.

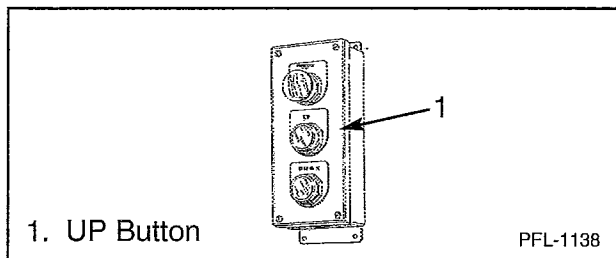
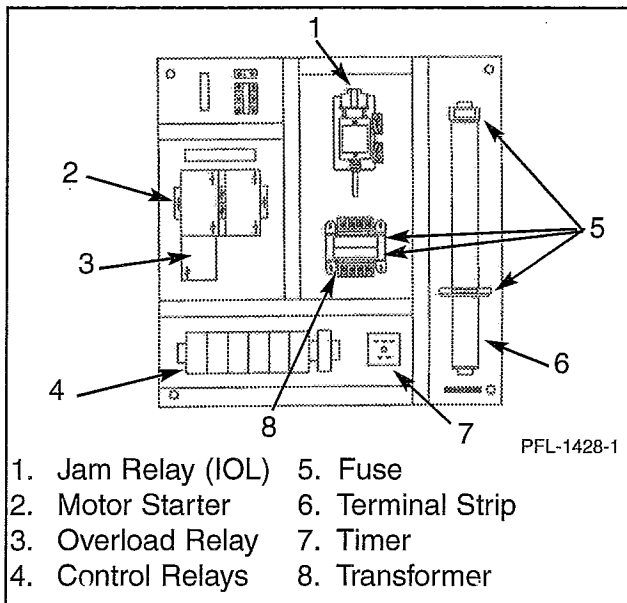


Figure 15



1. Jam Relay (IOL)
2. Motor Starter
3. Overload Relay
4. Control Relays
5. Fuse
6. Terminal Strip
7. Timer
8. Transformer

Figure 16

starter is reversible, the direction of travel can be alternated.) As the chains are fastened to the wheelblocks, which are bolted to the carriage, this action raises or lowers the carriage.

3. When it arrives at the next level, the **floor level limit switch** (one per level) is activated by movement of a cam located on the side of the carriage. When activated, this switch cuts the power to the motor circuit, the motor starter contacts drop out or open, the motor stops, and the brake is applied stopping the carriage. See Figure 17.
4. The **overtravel limit switch** is a safety device mounted directly above the upper level floor level limit switch. The only time it should activate is if there is a failure of the upper level limit switch. Again, activated by the cam mounted on the side of the carriage, it will send a signal to shut the unit down. Before activating the unit, find out why this occurred and correct the problem. See Figure 17.

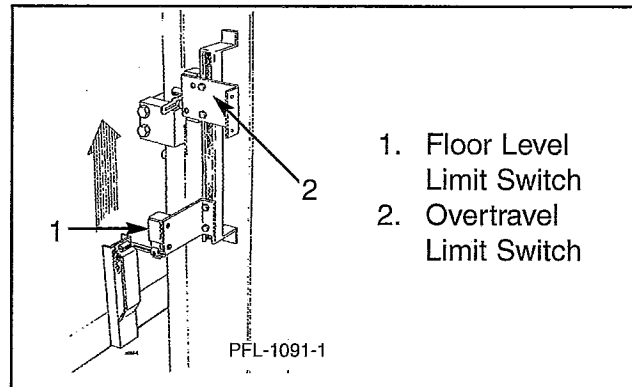


Figure 17

5. When excessive current draw causes overheating, the instantaneous overload (jam) 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. For proper adjustment procedures, see Instantaneous Trip Current (Overload) Relay (IOL).
6. When the lift or tensioner chain goes slack or breaks, the chain tensioner switch will activate, as described in the Mechanical Overview, cutting off the power to the motor and applying the brake. The safety cam will be triggered only if the chain breaks.

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. 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 platform.

⚠ 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 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.

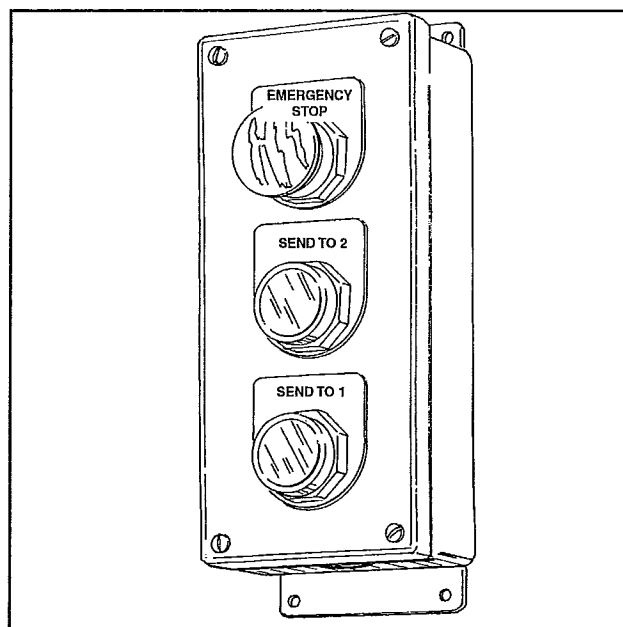


Figure 18

NOTE

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

M Series

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.	

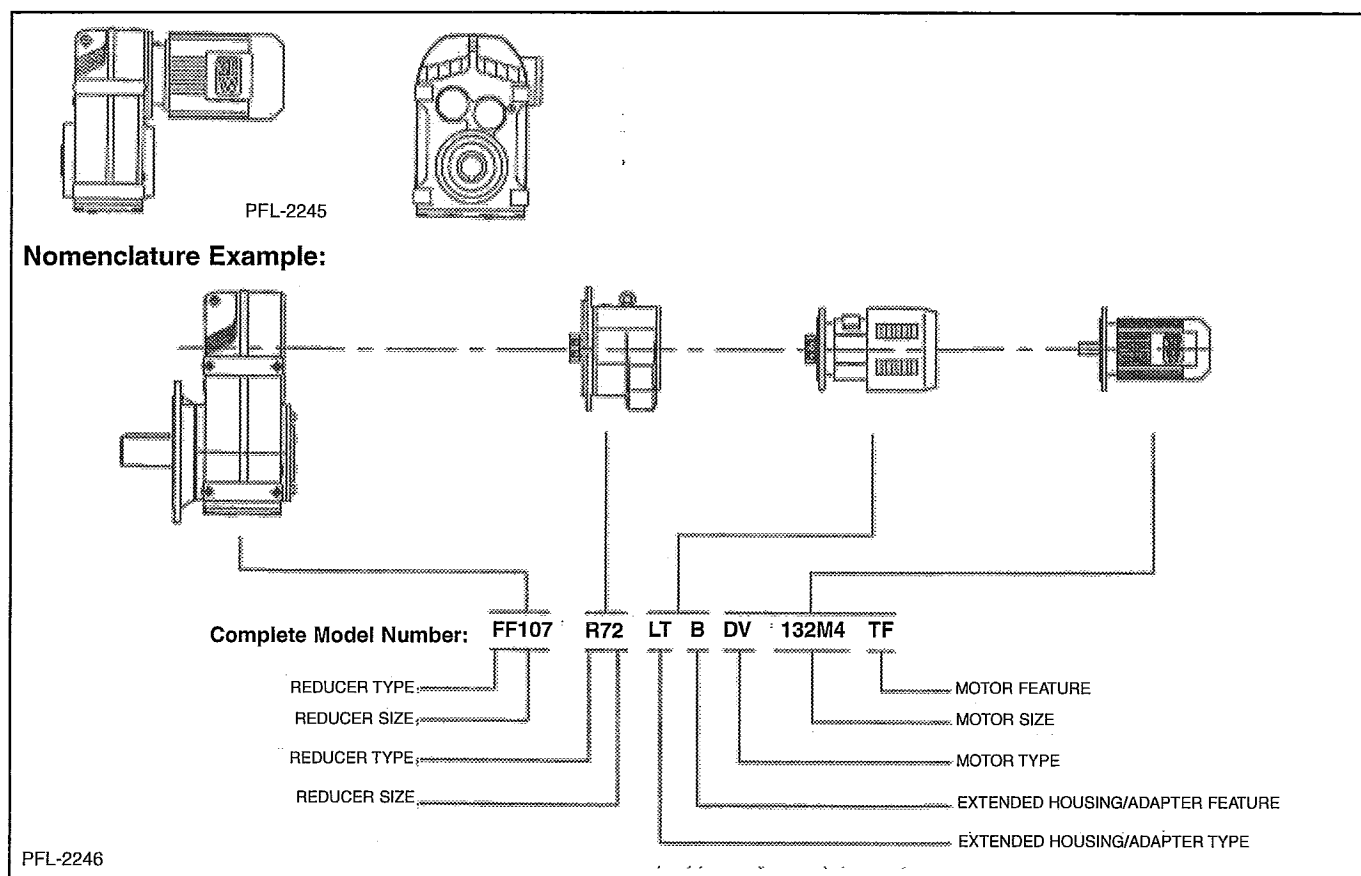
Follow above schedule. *Extreme temperatures, outdoor locations, corrosive environments, and/or contaminated environments will require more frequent maintenance and possibly different lubricants. (Check with your lubrication supplier for your particular needs.) Additional options, as ordered by the customer, 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 our Product Support Department for assistance.

Eurodrive Reducer Information



The SEW-Eurodrive model number consists of a series of letters to designate the type of unit or feature and numbers to designate the size of the unit. The model number always begins with the output side of the unit and ends with the input side. For use in our application, Pflow Industries, Inc. typically purchases only the following types:

HELICAL GEAR UNIT TYPES - FA - Shaft Mount. Typically there are no additional features or extended housing/adapter types.

EXTENDED HOUSING ADAPTER FEATURES

B - Disc Brake
HR - Manual Brake Release (self-reengaging)

MOTOR TYPES

DT, DV - AC Squirrel-cage Motor

MOTOR FEATURES

BM, BMG - Disc Brake
HR - Manual Brake Release (self-reengaging)
TH - Thermostat Protection (used in inverter applications)

M 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.

Eurodrive Motor Information

The SEW-Eurodrive AC motors are designed for continuous operation under difficult operating conditions. They are supplied integral to a SEW-Eurodrive gear unit or as foot mounted or flange mounted design.

ENCLOSURES

The AC motors are provided as totally enclosed fan cooled (TEFC) in accordance with NEMA MG1-1.26.2-1993. They are also provided as an IP54 enclosure rating in accordance with DIN 40050 as standard or with IP55 or IP65 ratings as a modification.

BEARINGS

The following chart shows the bearings for the appropriate motor frame sizes:

Frame Size	Driving End Side A		Fan End Side B
	Geared	Flanged and Footed	Geared, Flanged and Footed
DT71-80	6303 C3-2RS	6204 C3-2RS	6203 C3-2RS
DT90-100	6306 C3-2RS		6205 C3-2RS
DV112-132S	6307 C3-2RS	6208 C3-2RS	6207 C3-2RS
DV132M/ML-160M	6309 C3-2Z		6209 C3-2Z
DV160L-180	6312 C3-2Z		6213 C3-2Z
DV200-225	6314 C3-2Z		6314 C3-2Z

INSULATION CLASSES

All single-speed and tapped-wound, two-speed AC motors have Class B insulation as standard. Class F or Class H insulation can be provided as a modification.

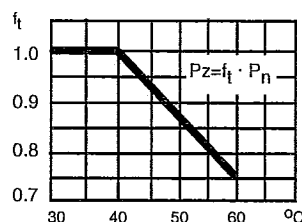
SUPPLY VOLTAGES AND FREQUENCIES

SEW-Eurodrive AC motors can be supplied suitable for operation on any voltage in the range of 200-660 volts. The standard voltages are 230/460V and 575V. The standard operation frequency is 60 Hz.

AMBIENT TEMPERATURE AND ALTITUDE

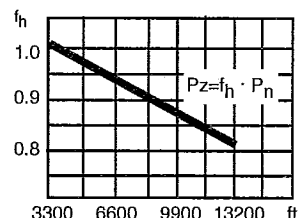
The ratings of all motors in this catalog are based on continuous operation at 40°C ambient temperature and a maximum elevation of 3,300 feet above sea level. For higher ambient temperatures or greater installation heights, it is necessary to reduce the motor power rating per Diagrams 1 and 2.

Diagram 1 - Power reduction as a function of the ambient temperature



P_z = reduced power f_t = reduction factor P_n = rated power

Diagram 2 - Power reduction as a function of elevation



P_z = reduced power f_h = reduction factor P_n = rated power

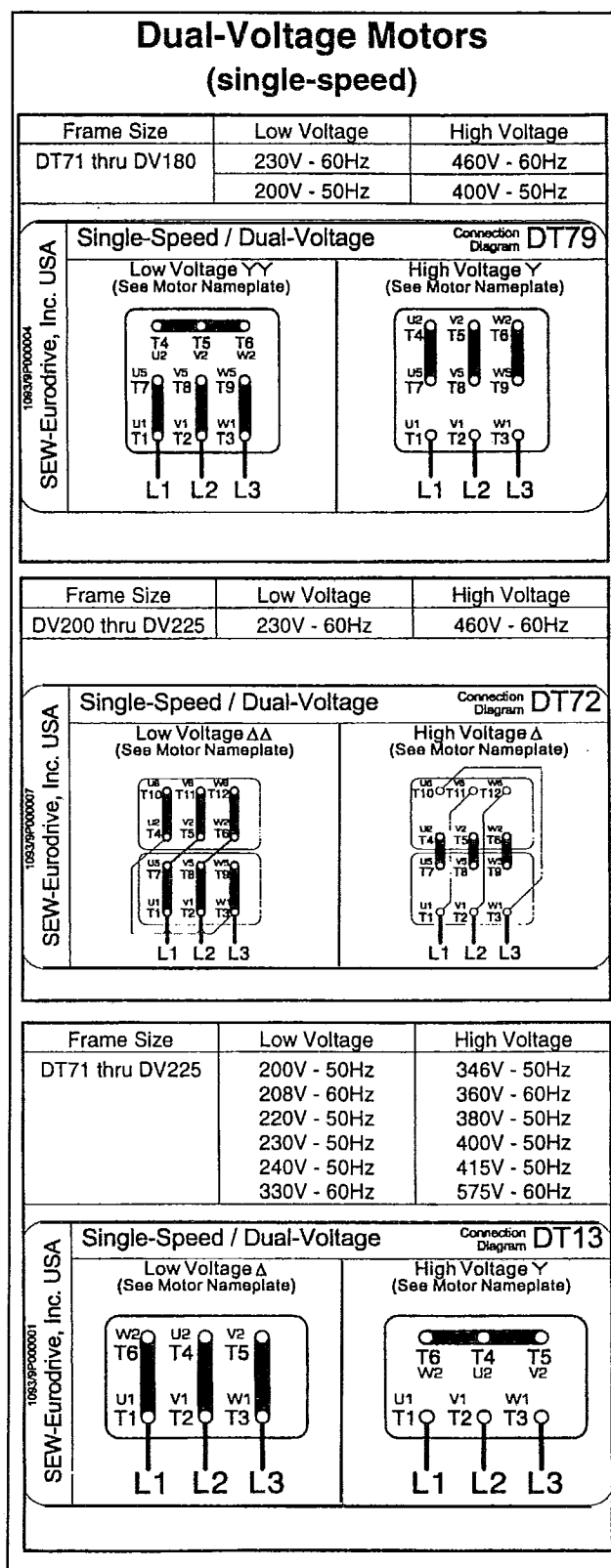
DUTY TYPES

S2 is a short-term operation, i.e., operation with a constant load state whose duration is sufficient to reach the thermal steady state condition.

S3 is a period operation not under the influence of the start-up, consisting of a sequence of similar cycles each comprising a period with constant load and a pause. The starting current should not markedly affect the warming up. Maximum period of 10 minutes.

MOTOR PROTECTION

Fuses installed in electrical supply lines do not protect the motor against overloads. The fuses merely protect the motor switchgear and supply cables in the event of short circuits. Standard overload relays for motors are adequate protection under normal operating conditions which involve relatively low starting frequencies and relatively short acceleration times coupled with low starting currents. However, whenever relatively high starting frequencies are required or the motor is required to start against considerable loads, then overload relays are unsuitable because the thermal time constant of motor and relay are not matched and the relays invariably trip out when set to the correct rated current. Only motors incorporating positive temperature coefficient thermistors offer full protection against thermal overloading irrespective of the reason. Motors so equipped can be used for operating conditions with high frequency starting, starting against heavy masses, and voltage and frequency fluctuations.



Eurodrive Brake Information

OPERATION

EURODRIVE gear motors 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 equivalent 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 mounted on the 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.

- Voltage to the rectifier energizes the brake coil and releases the brake.
- Removal of the voltage to the brake de-energizes the brake coil and allows the brake to be applied.
- The SR relay is to switch the DC voltage to
- brake coil shortening brake response time.

The AC voltage to the brake will be rectified to a DC level of 50% of the AC voltage applied.

MAINTENANCE

The only maintenance normally required is to ensure that the area between the cooling fins and the area through which the air is drawn in the fan guard is kept clean 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 being secured or blocked in place.

NOTE

Only a qualified controls electrician is to 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

As with previous brake systems, the BMG brake with SR relay is based on the fail-safe circuit principle. The brake is released when the power is applied to the brake coil, and a spring applies the brake when power is removed. Thus, in case of a power failure, the brake still holds.

The brake coil actually 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; thus 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, an SR relay is being used. Units without SR relay (junction box on motor does not have it sticking out the side) must have the brake circuit wired from control panel to junction box on drive base.

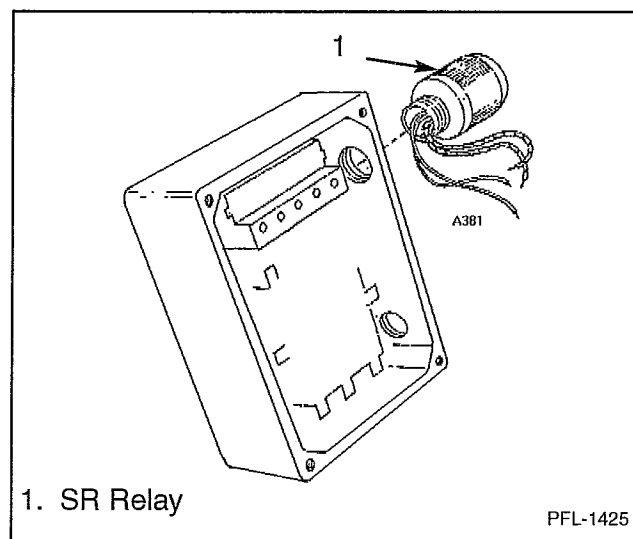


Figure 1

M Series

Eurodrive Brake Information

SR RELAY WIRING

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. Connection diagrams for 208/360 and 230/460 VAC Dual Voltage Motors with 200 VAC BMG Brake and SR Relay.

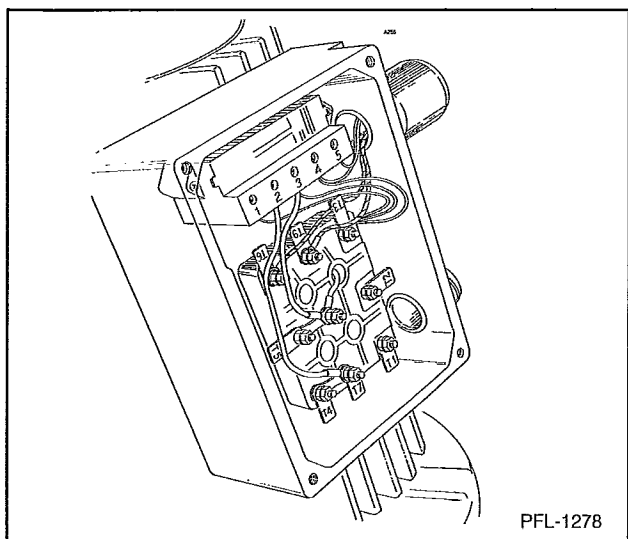


Figure 2

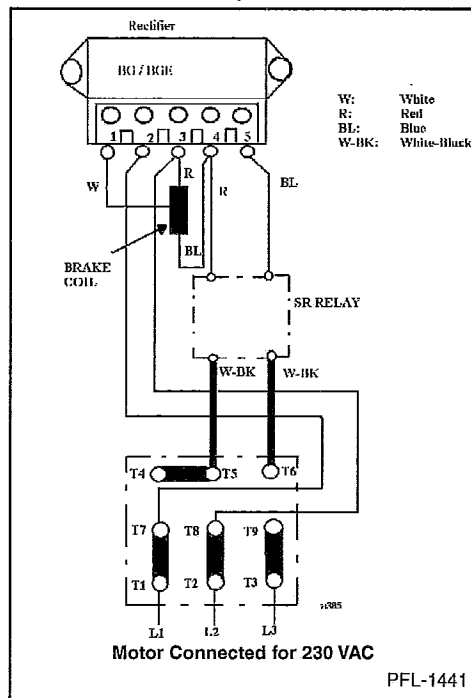


Figure 3

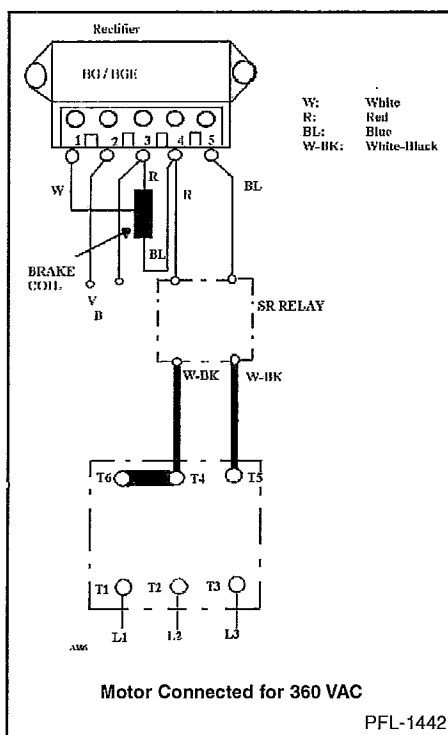


Figure 4

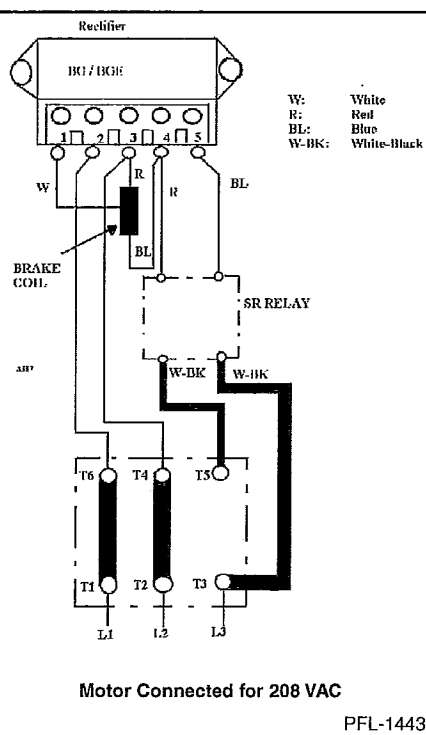


Figure 5

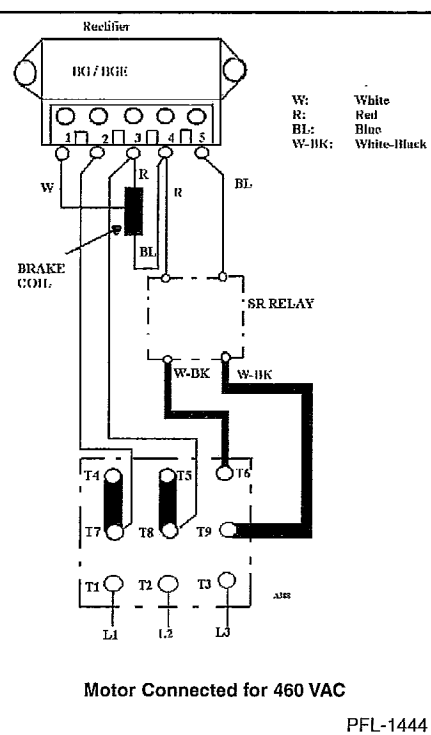


Figure 6

Eurodrive Brake Information - TROUBLESHOOTING

In case of a brake failure, check first for an open brake coil. If the brake coil is okay, follow the Troubleshooting Chart below.

FAULT	CAUSE	SOLUTION
<u>Brake Does Not Disengage</u>	Wrong voltage on the rectifier module Rectifier dead The maximum permissible air gap due to brake lining wear. Voltage drop in the line high	Apply correct voltage (check the nameplate) Replace rectifier. Readjust brake. If brake lining is completely worn out, replace the brake disc. Ensure correct line voltage.
<u>Motor Does Not Brake</u>	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	Replace brake disc. Reset brake. The adjusting nuts must be properly adjusted.
<u>Braking Action Is Too Slow</u>	The brake is actuated with the normal brake action circuit. SR relay defective During reassembly, the brass shims were omitted.	The brake is to be actuated with fast brake action circuit. Replace relay Install the brass shims.

ADJUSTING BRAKE AIR GAP

NOTE

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

1. Remove cover and fan.
2. Tighten the three brake adjustment nuts lightly.

CAUTION

Do not overtighten!

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 air gap is obtained between shim and stationary disc. See chart for correct air gap.

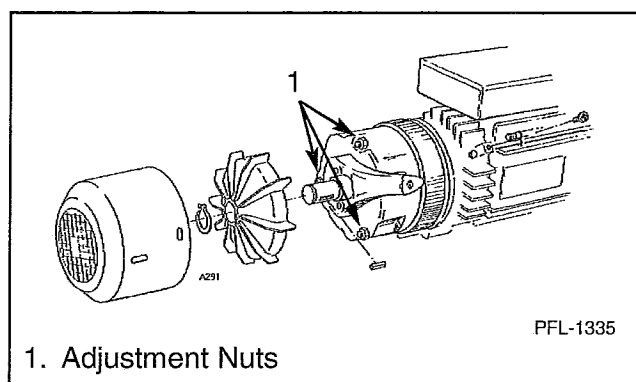


Figure 7

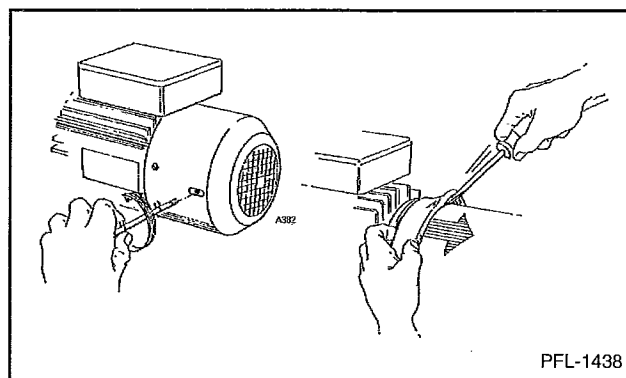


Figure 8

AIR GAP REQUIREMENTS

- 2 HP, 3 HP, 5 HP
Minimum 0.01 inch - maximum 0.024 inch
- 7.5 HP, 10 HP, 15 HP
Minimum 0.012 inch - maximum 0.047 inch
- Above 15 HP
Consult factory for air gap

NOTE

Air gap must be equal all around to ensure proper braking operation.

M Series

TO INSPECT BRAKE DISC

Remove cover and fan. Slide rubber seal back to expose brake disc.

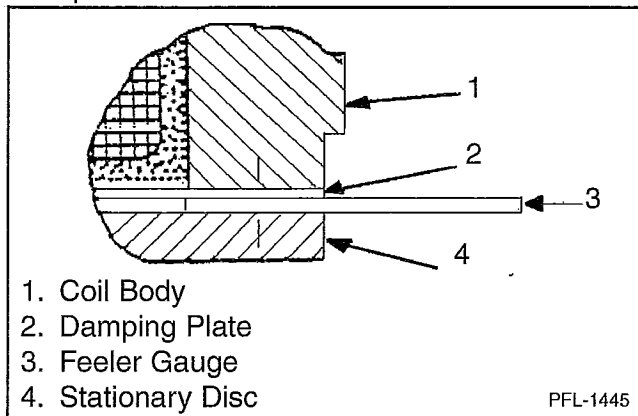


Figure 9

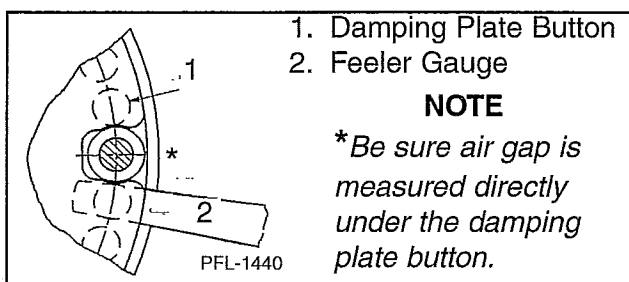


Figure 10

THE HAND RELEASE MECHANISM

Most of the brakes are supplied with a hand-operated release lever. This allows opening of the brake without applying power, allowing for 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. It will re-engage automatically once 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.

NOTE

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 $K \Omega$.
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.

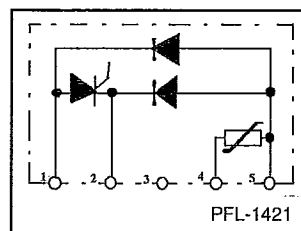


Figure 11

CAUTION

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

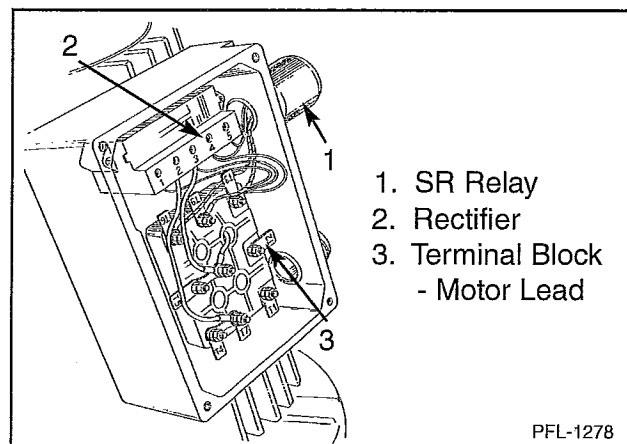


Figure 12

Safety Cam Inspection

Routine inspection of the safety cams is **EXTREMELY** important as they are one of the major safety devices of our product.

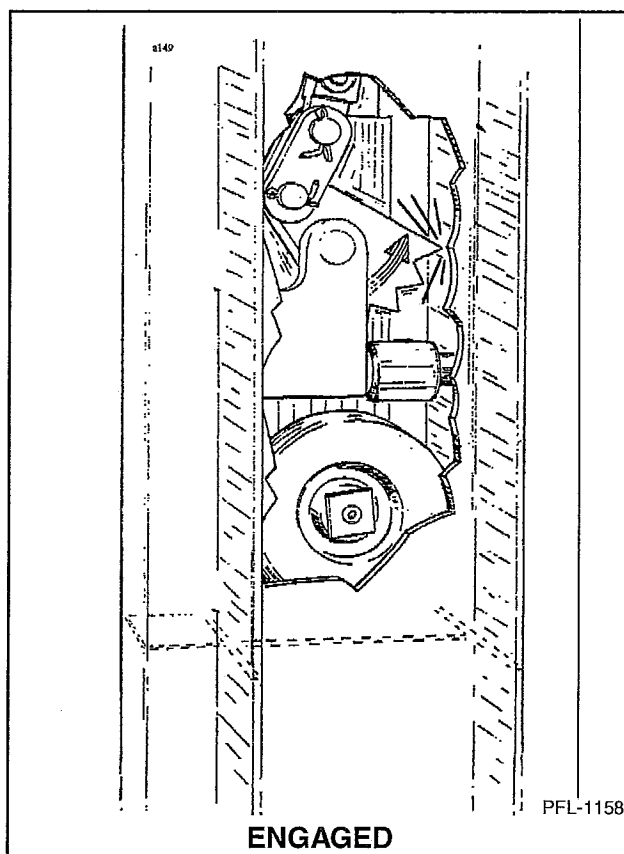
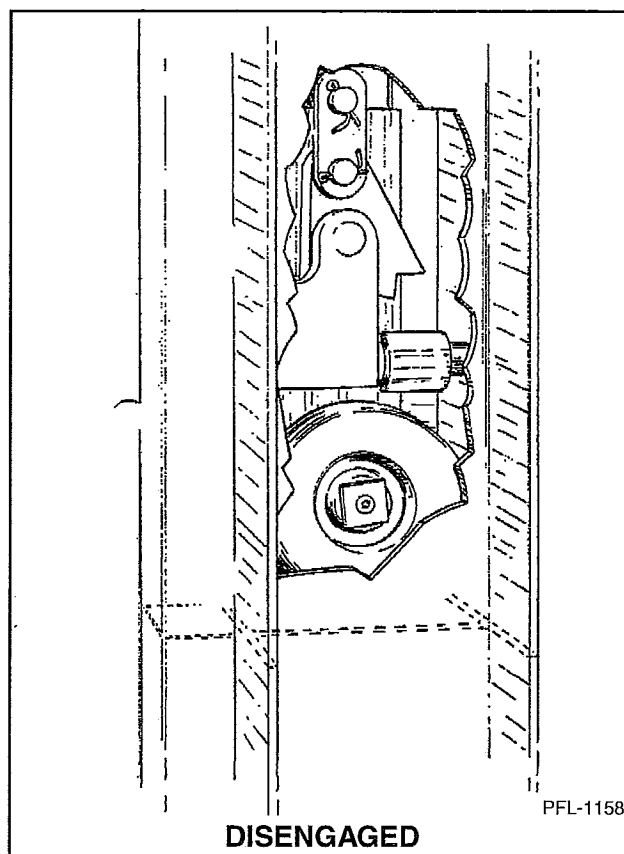
VISUAL INSPECTION

The cam should be checked for rust and corrosion, chips in the teeth, and other visual signs of wear.

ROTATION

Make sure safety cams rotate completely by slackening the chains.

If you have any questions or concerns, please feel free to contact our Product Support Department for assistance.



M Series

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.	

Troubleshooting

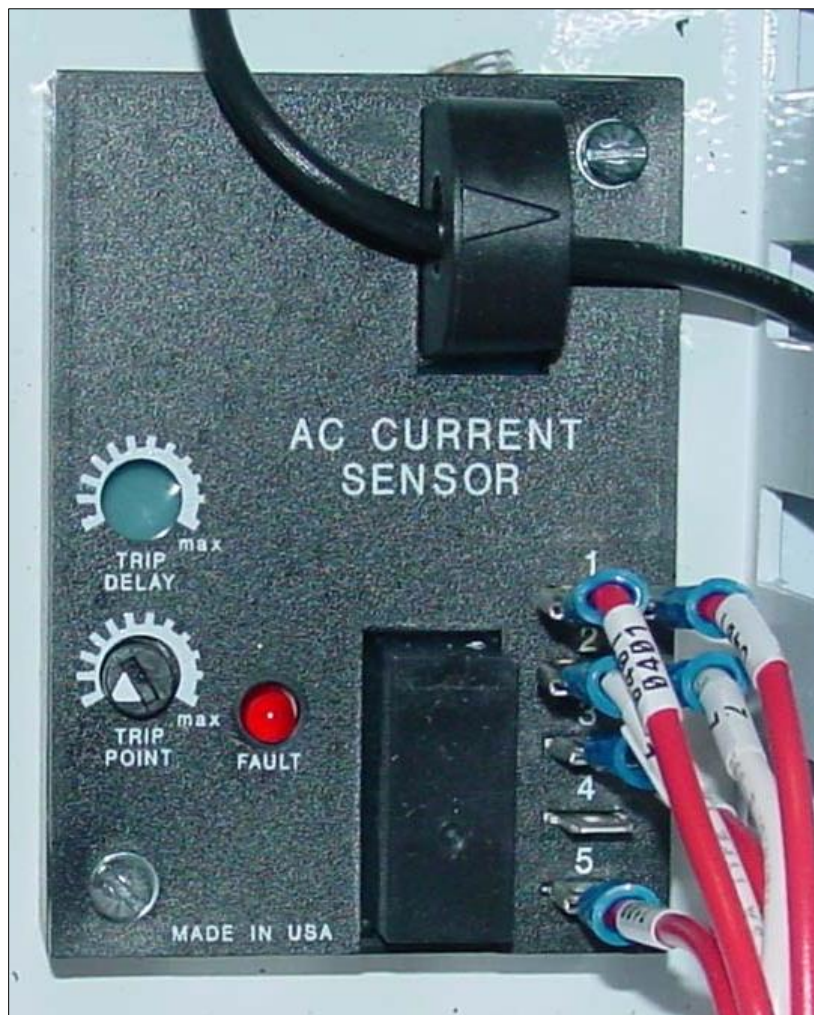
SYMPTOM	POSSIBLE CAUSE	SUGGESTED SOLUTION	REF.
Carriage raises, but it will not lower.	Mechanical interference	Identify the problem; remove and repair as needed.	
Carriage lowers but stops early.	Debris in the pit.	Clean pit out.	
Rough or noisy operation	Interference between chain and guards or guides.	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	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.	

M Series

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.

M Series

Recommended Spare Parts Listing-Series M

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.

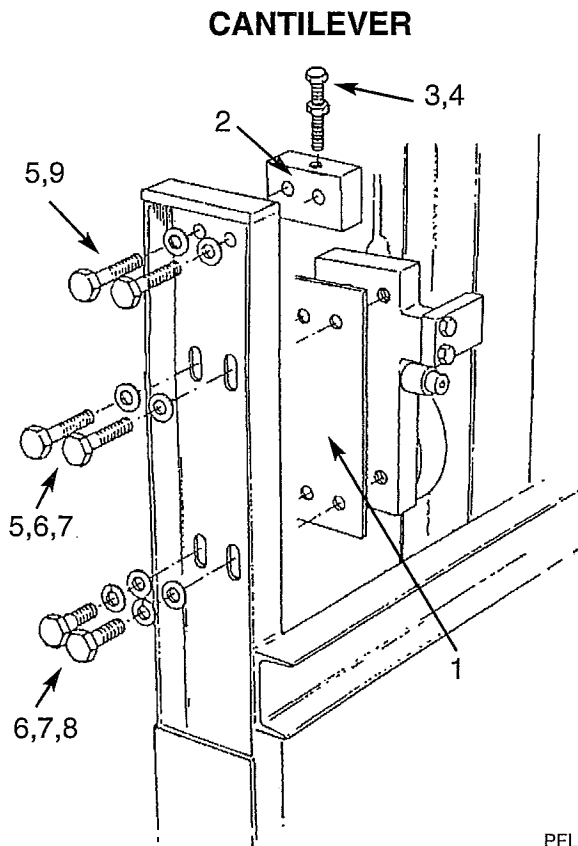
Quality	Part Number	Description	Price for Each
2		<u>Lift Rollers</u>	
2		Roller, Main	\$
2		Screw, Guide Roller	\$
2		Roller, Trolley Guide	\$
2		<u>Chain Tensioner Components</u>	
2		S-Hooks	\$
2		Swivel	\$
2		Turnbuckle	\$
1		<u>Electrical Components</u>	
1		Button with contact, UP/DOWN	\$
1		Button with contact, E-Stop	\$
1		Timer	\$
1		Motor Circuit Protector	\$
1		Limit Switch	\$
1		Arm, Limit Switch	\$
1		<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.

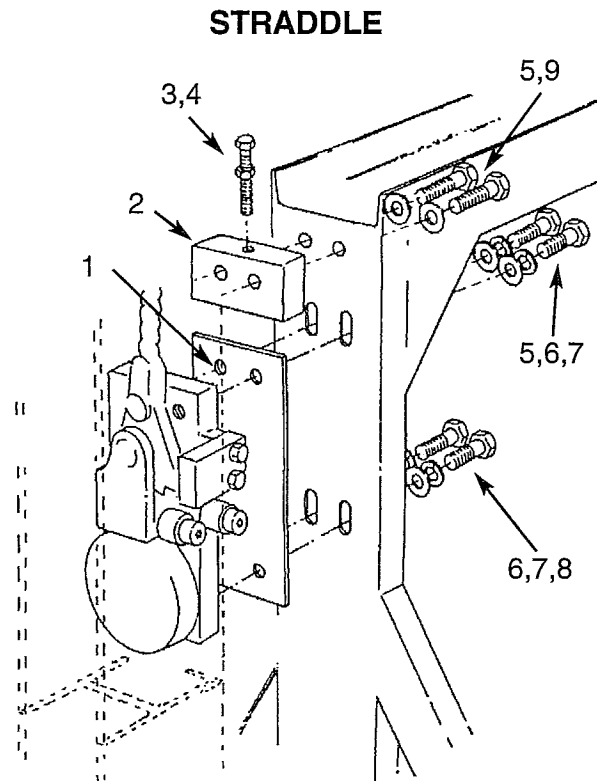
PFlow Industries, Inc. 6720 N. Teutonia Avenue, Milwaukee, WI. 53209
Phone (414) 352-9000 Fax (414) 352-9002

M Series

Adjustable Wheelblock Assembly



PFL-2259



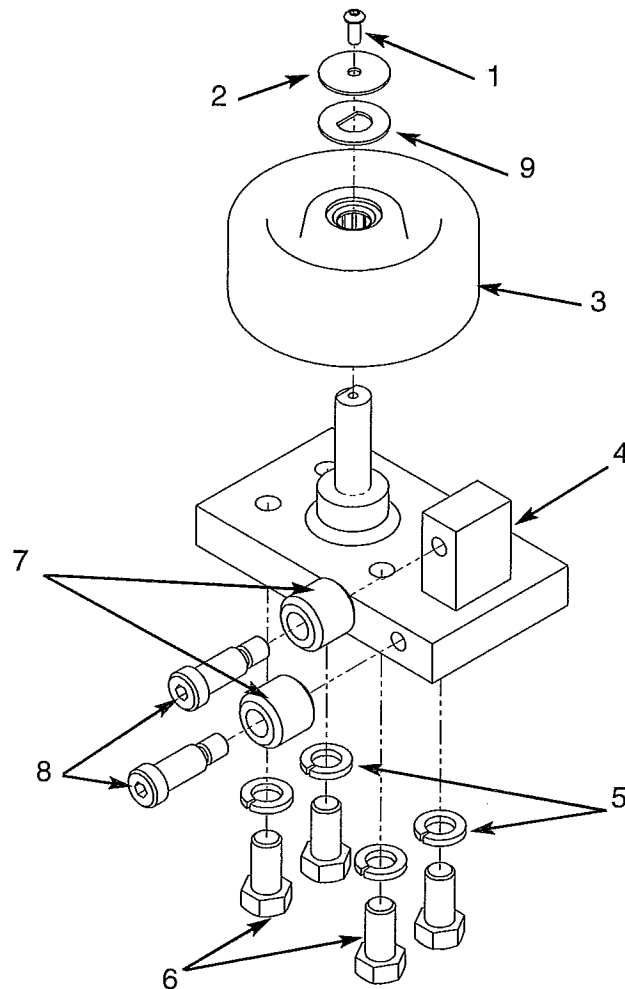
PFL-2260

Item	Qty.	Part No.	Description
1	1	2377-0001	Spacer, Wheelblock, 1/8" (Not used on 4" upright)
2	1	9677-0000	Block, Adjuster
3	1	8872-0088	Screw, HHC, 1/2-13, UNC 5-1/2
4	1	6358-0013	Nut, Hex, 1/2-13
5	2	9237-0020	Screw, HHCS, 1/2-13
6	2	5858-0015	Lockwasher, STD 5/8
7	2	6296-0015	Washer, Flat, 5/8
8	1	6758--0020	Screw, 5/8-11 UNC x 1 1/4
9	1	5858-0013	Lockwasher, STD 1/2

Lower Wheelblock Assembly - Phenolic

Complete Assembly (5-1/4) - Part No. 2721-0000 / Part No. 2089-0000

Complete Assembly (5-3/8) - Part No. 2721-1000 / Part No. 2089-1000



2721-0000-XV-N

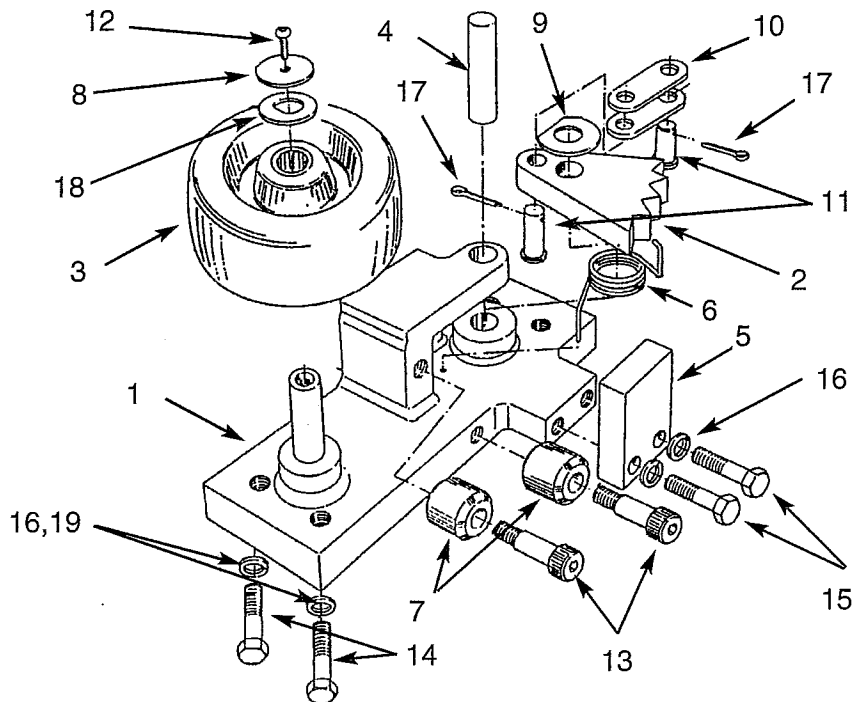
Item	Qty.	Part No.	Description
1	1	2888-0010	Screw, BH/SC, 1/4-20 x 5/8
2	1	5222-0000	Washer, Flat, 9/32 ID x 1 1/2 OD
3	1	2591-0001	Wheel, Phenolic (5-1/4)
	1	2591-1001	Wheel, Phenolic (5-3/8)
4	1	Consult Factory	Wheelblock Weldment, RH or LH
5	4	5858-0015	Lockwasher, STD 5/8
6	4	6758-0020	Screw, HHC, 5/8-11 x 1 1/4
7	2	5221-0000	Guide Roller, Assembly
8	2	5874-0020	Bolt, Shoulder, SOC HD, 5/8 x 1 1/4
9	1	8774-0000	Washer, D, 3/4 ID x 1 1/2 OD

M Series

Upper Wheelblock Assembly - Phenolic

Complete Assembly (5-1/4) - Part No. 6196-0000 / Part No. 6197-0000

Complete Assembly (5-3/8) - Part No. 6196-1000 / Part No. 6197-1000



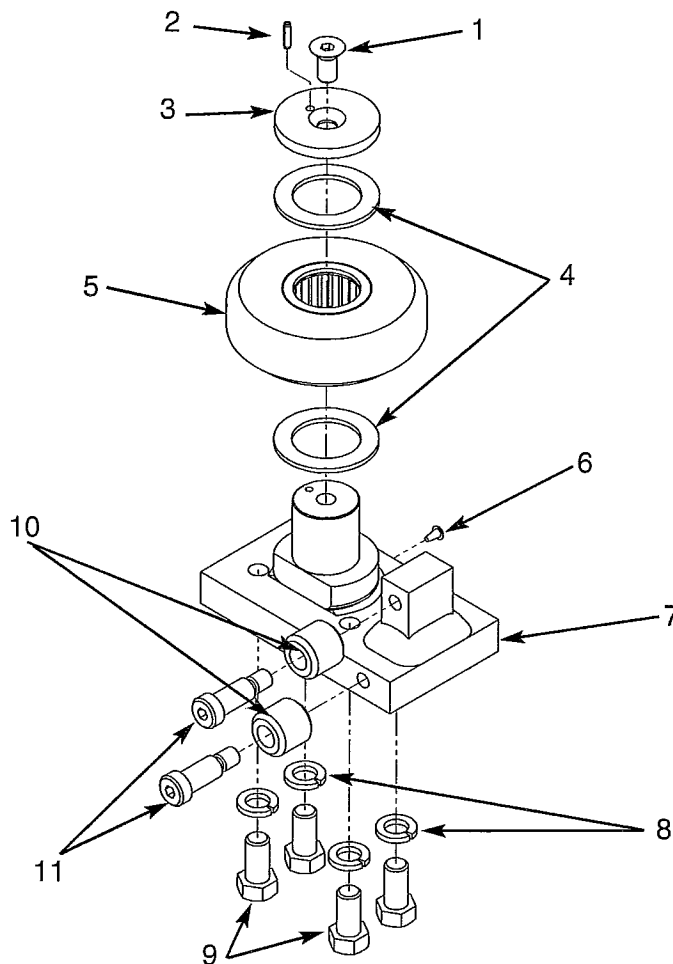
PFL-1605

Item	Qty.	Part No.	Description
1	1	Consult Factory	Wheelblock Weldment, RH or LH
2	1	6186-0000	Cam, Safety
3	1	2591-0000	Wheel, Phenolic (5-1/4)
	1	2591-1001	Wheel, Phenolic (5-3/8)
4	1	5230-0000	Pin, Cam
5	1	2754-0000	Shoe
6	1	2443-0000	Spring, Cam, RH, or
	1	2127-0000	Spring, Cam, LH
7	2	5221-0000	Roller, Guide
8	1	5222-0000	Washer, Flat 9/32 ID x 1-1/2 OD
9	1	8339-0000	Bearing Thrust
10	2	6187-0000	Link, Safety Cam to Toggle
11	2	2521-0000	Pin, Clevis 3/4 x 2
12	1	2888-0010	Screw, BHC, 1/4-20 x 5/8
13	2	5874-0020	Bolt, Shoulder, 5/8 x 1-1/4
14	4	6758-0020	Screw, HHC, 5/8-1 x 1-1/4
15	2	2198-0040	Screw, HHC, 5/8-11 x 2-1/4, Grade 8
16	6	5858-0015	Lockwasher, STD 5/8
17	2	2522-0000	Pin, Cotter
18	1	8774-0000	Washer, D
19	4	7768-0015	Washer, Flat, 5/8 SAE

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

Complete Assembly, Part No. 6493-0000, Right Hand

Complete Assembly, Part No. 6494-0000, Left Hand



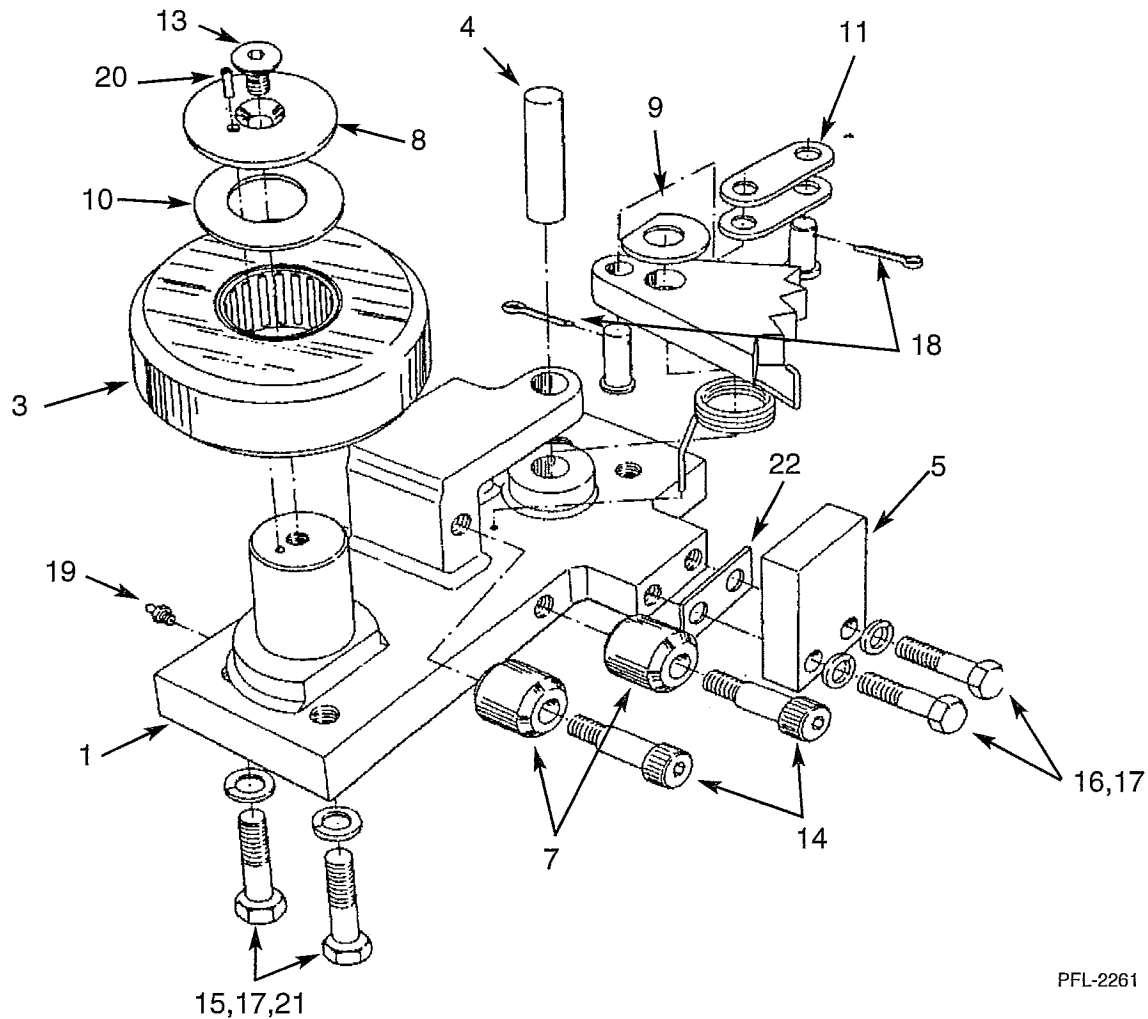
6493-0000-XV-N

Item	Qty.	Part No.	Description
1	1	4299-0016	Screw, FHSC, 1/2 x 1 LG w/Nylock
2	1	5209-0012	Pin, Roll - 3 1/16 DIA X 3/4 LG
3	1	3629-0000	Retainer, Steel Wheel
4	2	3622-0000	Washer, Thrust
5	1	6381-0000	Wheel, Steel, 5 1/4 w/Roller Bearing
6	1	9975-0006	Plug/Cap, Plastic, Tapered
7	1	2400-0000	Whlblk Wldm, Lower RH
		2453-0000	Whlblk Wldm, Lower LH
8	4	5858-0015	Lockwasher, STD 5/8
9	4	6758-0020	Screw, HHC, 5/8-11 x 1 1/4 LG
10	2	5221-0000	Roller Guide Assembly, 1 1/8 LG
11	2	5874-0020	Bolt, Shoulder, SH, 5/8 x 1 1/4

M Series

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



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	6381-0000	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

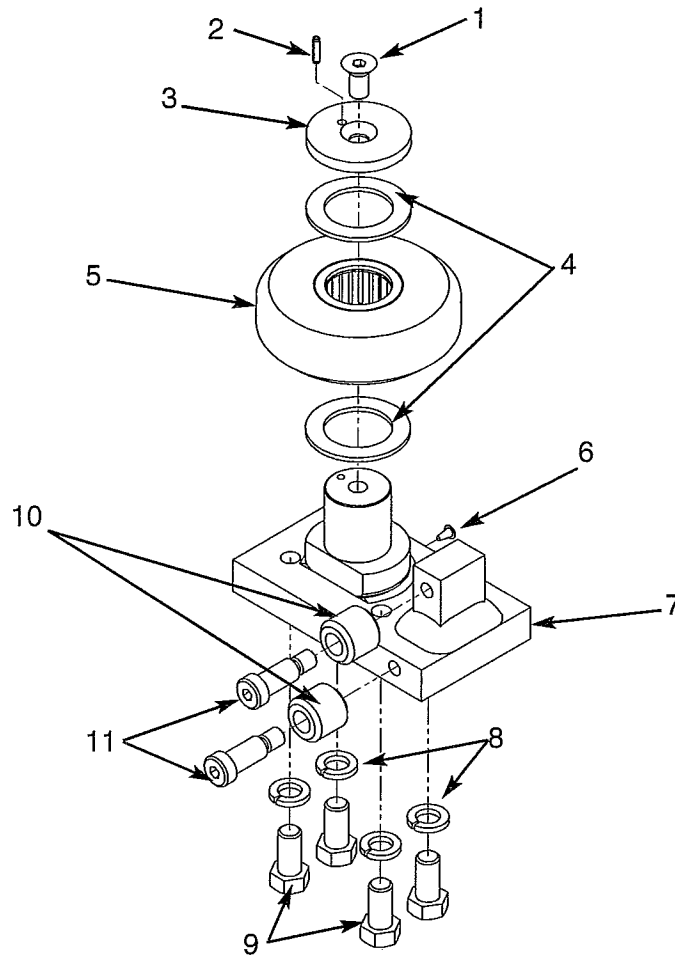
Item	Qty.	Part No.	Description
12	2	2521-0000	Pin, Clevis 3/4 x 2
13	1	4299-0016	Screw, FHSC, 1/2-13 x 1
14	2	5874-0020	Bolt, Shoulder, 5/8 x 1 1/4
15	4	6758-0020	Screw, HHC 5/8-11 x 1 1/4
16	2	2198-0040	Screw, HHC 5/8-11 x 2 1/4
17	6	5858-0015	Lockwasher, STD 5/8
18	2	2522-0000	Pin, Cotter
19	1	2590-0000	Fitting, Zerk
20	1	5209-0012	Pin, Roll
21	4	7768-0015	Washer, Flat, 5/8 SAE
22	*	2767-0000	Spacer, Wheelblock Shoe
*Number of spacers dependent upon column size. #15 = 0 #20 = 1 #25 = 2			

Lower Wheelblock Assembly

5 3/8 Steel Wheel w/Roller Bearing

Complete Assembly, Part No. 2403-0000, Right Hand

Complete Assembly, Part No. 2474-0000, Left Hand



2403-0000-XV-N

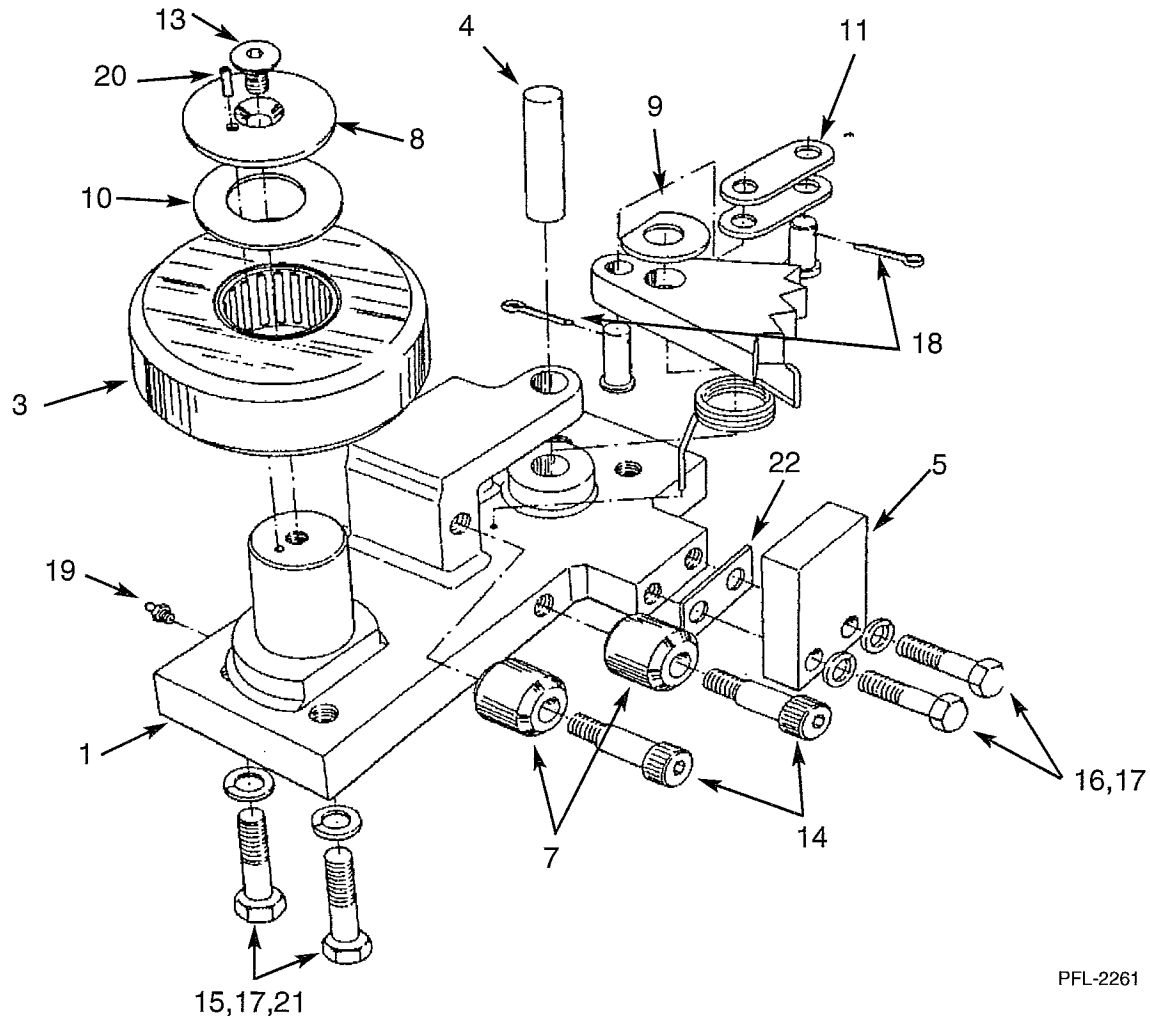
Item	Qty.	Part No.	Description
1	1	4299-0016	FHSMS, 1/2-13 x 1
2	1	5209-0012	Pin, Roll 3/16 x 3/4
3	1	3629-0000	Washer, Retainer STL
4	2	3622-0000	Washer, Thrust, 2-3/4 OD
5	1	6304-0001	Wheel Assy, STL, 5 3/8
6	1	9975-0000	Plug/Cap, Plastic
7	1	2400-0000	Whlblk Wldm, Lower RH
		2453-0000	Whlblk Wldm, Lower LH
8	4	5858-0015	Lockwasher, STD 5/8
9	4	6758-0020	Screw, HCS, 5/8-11 x 1 1/4 GR 2
10	2	5221-0000	Roller, Guide, Plastic 1
11	2	5874-0020	Bolt, Shoulder, SH, 5/8 x 1 1/4 x 1/2-13

M Series

Upper Wheelblock Assembly 5 3/8 Steel Wheel w/Roller Bearing

Complete Assembly, Part No. 6198-0000, Left Hand

Complete Assembly, Part No. 6199-0000, Right Hand



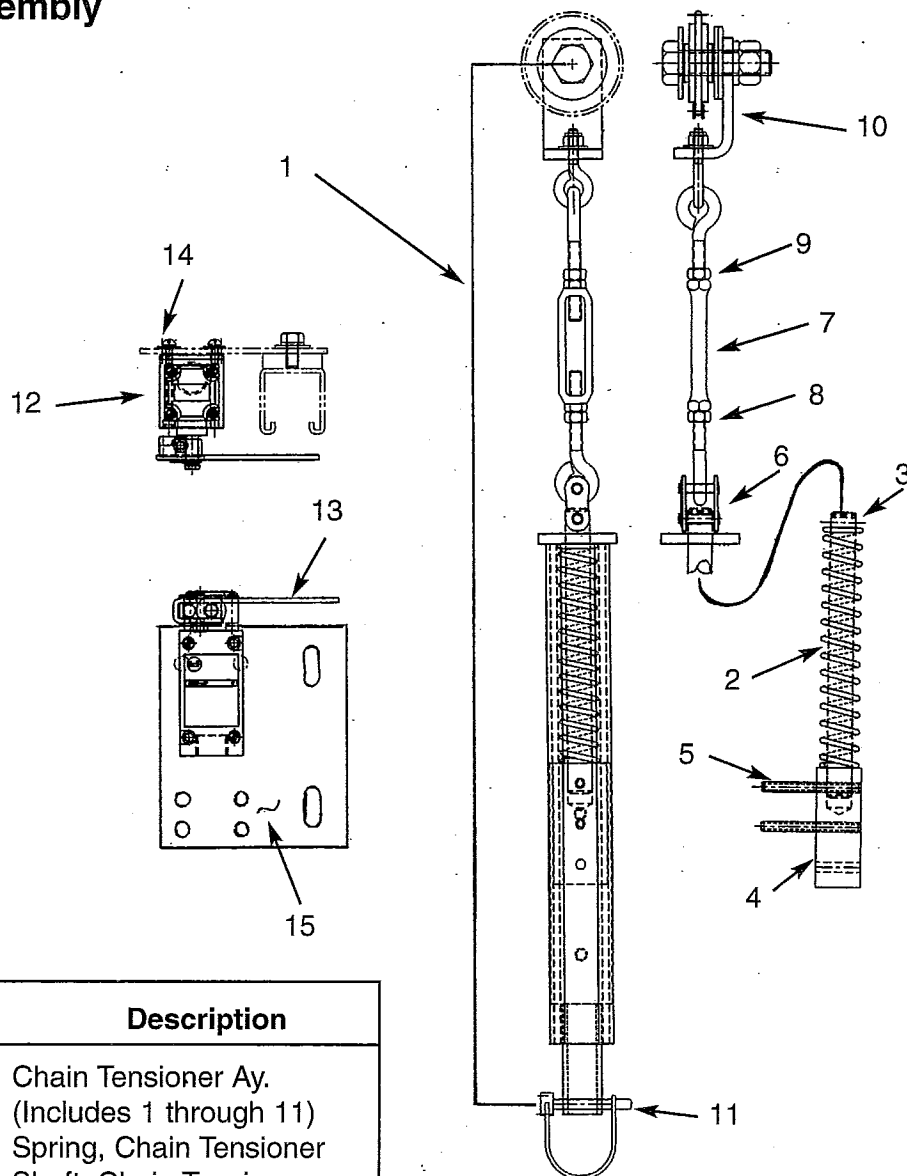
PFL-2261

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	6381-0000	Wheel, 5 3/8 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
22	*	2767-0000	Spacer, Wheelblock Shoe

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

Chain Tensioner Assembly



PFL-2114

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	5668-0000	Link, Tensioner
7	1	2520-0000	Turnbuckle, Tensioner
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, Tensioner Anchor
12	1	**	Limit Switch
13	1	**	Arm, Limit Switch
14	2	**	Bolt, Limit Switch Mtg.
	2	**	Lockwasher, Switch Mtg.
	2	**	Washer, Switch Mtg.
15	1	10182-0000	Bracket, Switch Mtg.

**Contact Pflow Industries for part number. Serial number required.

Chain Loop Arrangement

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

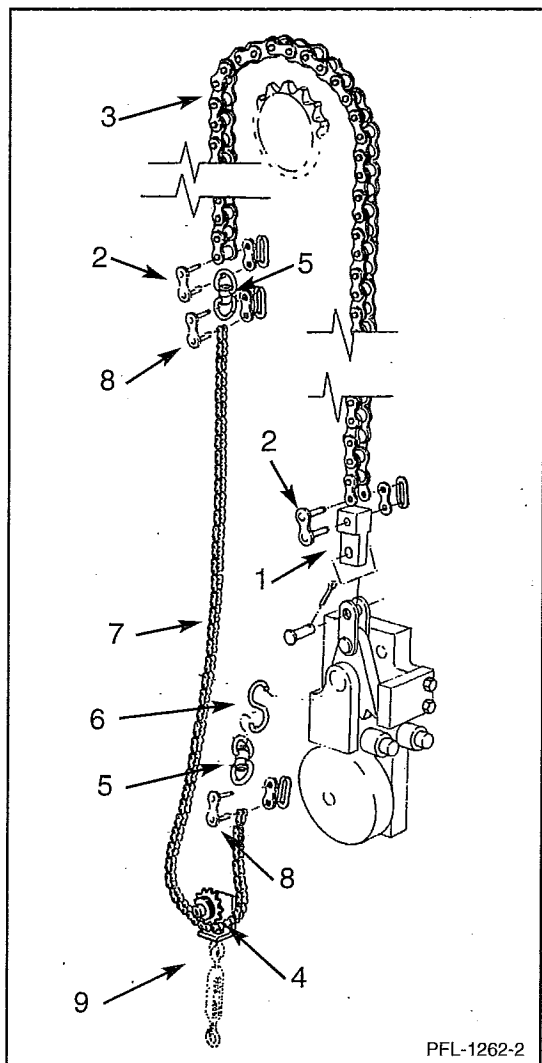
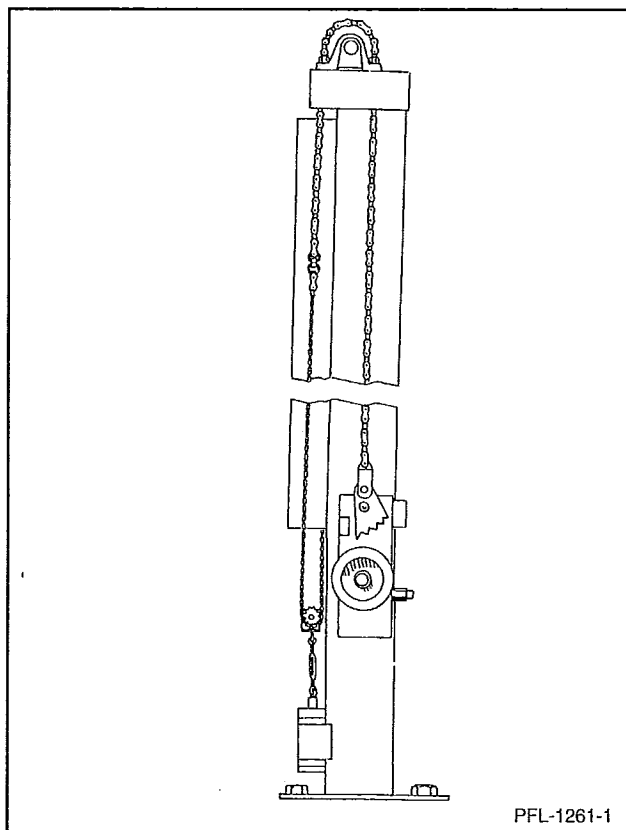
The drive chain (not shown) is applicable to the F-Series only and runs between the sprockets on the top of the unit.

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

NOTE

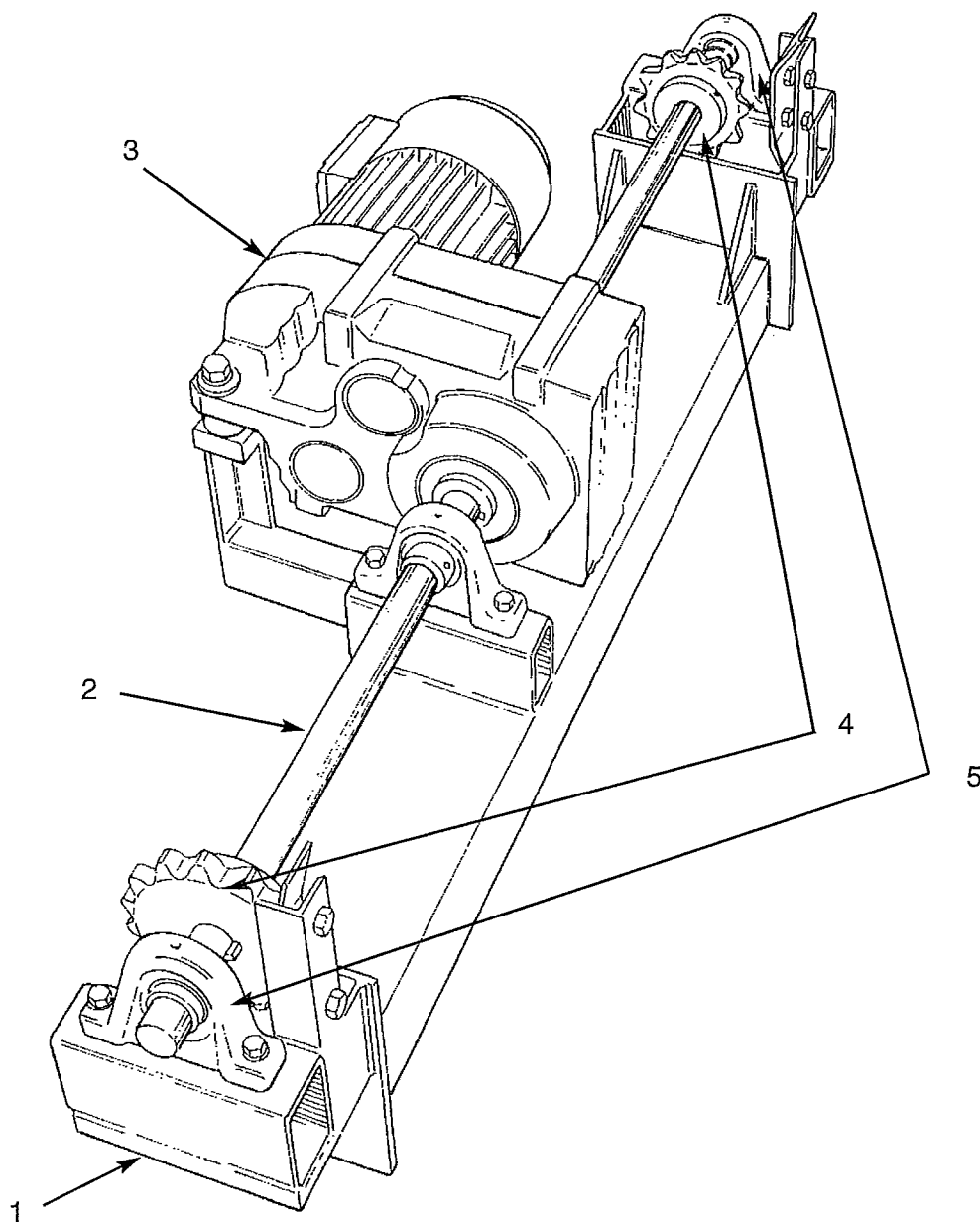
Size of drive and lift chain vary by application. Consult factory before ordering.

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



Item	Qty.	Part No.	Description
1	1	6191-0000 6190-0000 6189-0000 6188-0000	Toggle, #60 Chain, or Toggle, #80 Chain, or Toggle, #100 Chain, or Toggle, #120 Chain
2	2	5668-0000 2618-0000 2523-0000 5186-0000	Master Link, #60 Chain or Master Link, #80 Chain or Master Link #100 Chain or Master Link, #120 Chain
3	1	5667-0000 2692-0000 2693-0000 4102-0000	Chain, #60 or Chain, #80 or Chain, #100 or Chain #120
4	1	7937-0000	Sprocket Assembly
5	2	7651-0000	Swivel, Round Eye Double
6	1	3715-0000	"S" Hook
7	1	7938-0000	Chain, #35 x Length
8	1	7953-0000	Master Link, #35 Chain
9			Chain Tensioner Assembly (partial view)

Drive Base Assembly



PFL-2263

These are custom-designed components and vary by job. To ensure correct replacement components are used, you must consult the factory for proper part numbers. Please have the SO number from the reducer assembly and the Pflow serial number available when requesting this information.

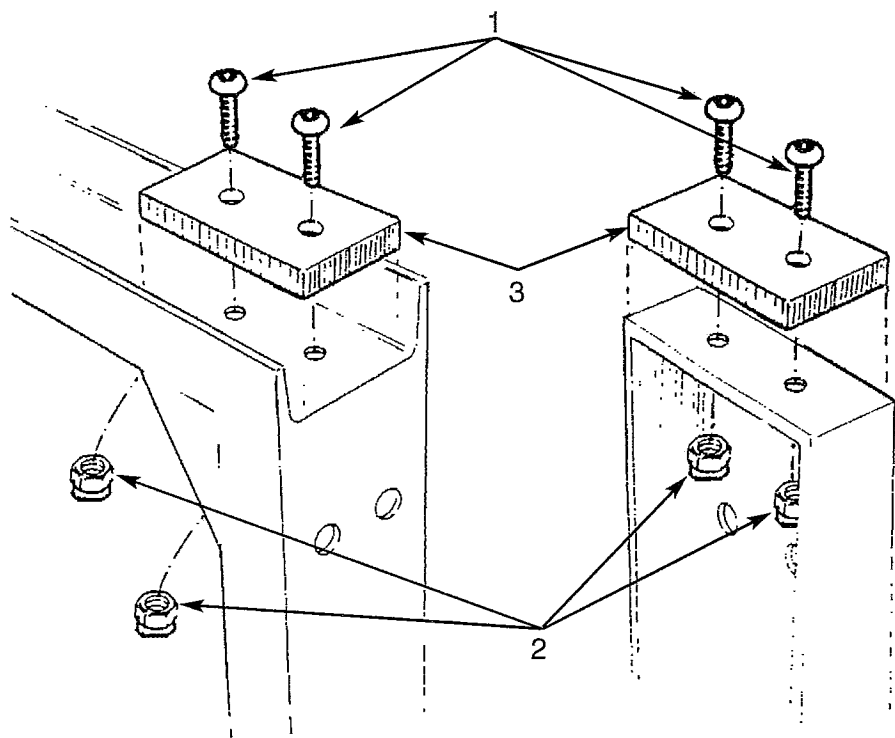
Item	Qty.	Description
1	1	Drive Base Weldment
2	1	Drive Shaft
3	1	Motor/Brake/Reducer Assembly
4	2	Drive Sprocket
5	2	Bearing, Pillow Block

M Series

Carriage Stop

STRADDLE CARRIAGE

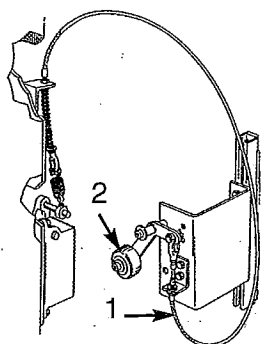
CANTILEVER CARRIAGE



Item	Qty.	Part No.	Description
1	1	8399-0016	Screw, BHSC 3/8-16 UNC 1"
2	2	6708-0011	Nut, Lock, Nylon, 3/8
3	1	10414-0000	Pad, UHMW

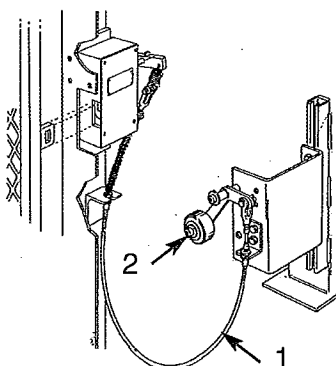
The **INTERLOCK** is a device used to mechanically prevent the gate from opening. Below are the standard types of interlocks supplied. As this is a safety device, replacement components are only available as shown below. Some configurations may vary by application.

ANDERSON CABLE



PFL-1885-6A

GAL CABLE

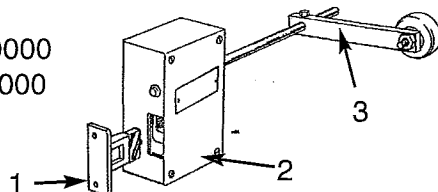


PFL-1885-7A

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

GAL (Left Hand Shown)

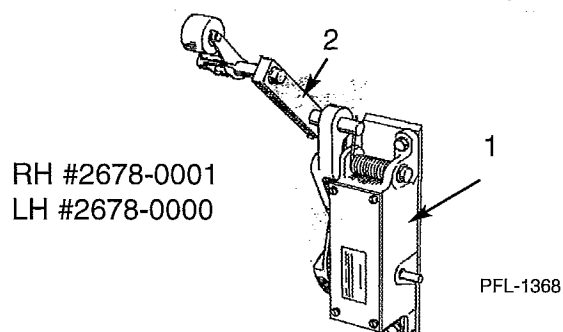
RH #2690-0000
LH #2691-0000



PFL-1475

1. Keeper #3838-0000
2. Contact Block (inside) #3832-0000
3. Arm w/Roller #4342-0000

ANDERSON (Right Hand Shown)

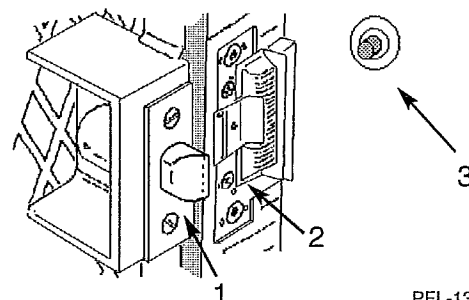


RH #2678-0001
LH #2678-0000

PFL-1368

1. Contact Block (inside)
2. Arm #6950-0000

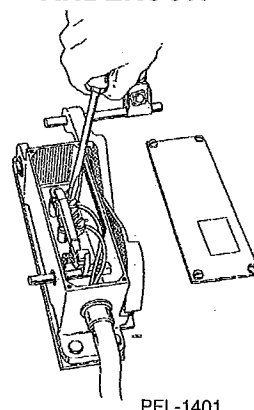
ELECTRIC STRIKE



PFL-1389

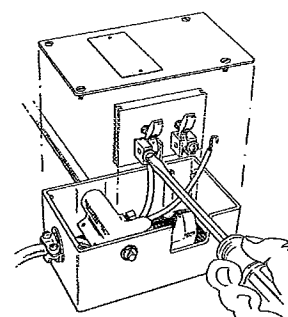
1. Spring Latch #7566-0000
2. Strike #9169-0000
3. Button #9096-0000

ANDERSON



PFL-1401

GAL

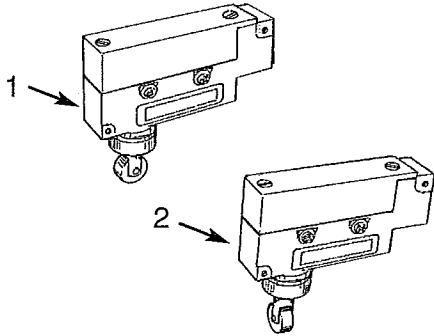


PFL-1250

See schematic for proper wiring instructions.

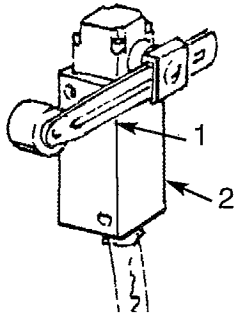
M Series

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

BILL OF MATERIALS			PART NO.	REF.
ITEM	QTY.	DESCRIPTION	PRICE	
1	2	SWELL. DOUBLE END EYE 1/4"	3751.00000 N	
2	1	SWELL. DOUBLE END EYE 1/4"	3751.00000 N	
3	2	LINK MASTER, NO. 33 CHAIN	7951.00000 A	
4	2	LINK MASTER, NO. 33 CHAIN	7951.00000 A	
5	1	LINK MASTER, NO. 100 CHAIN	2321.00000 N	
6	1	LINK MASTER, NO. 100 CHAIN	2321.00000 N	
7	1	CHAIN BRACKET WELDMENT - 2.53	10347.00000 N	
8	1	CHAIN BRACKET WELDMENT - 2.53	10347.00000 N	
9	2	WASHER PLAIN 3/4" DIA.	6591.00010 A	
10	2	WASHER PLAIN 3/4" DIA.	6591.00010 A	

Note:

QUANTITIES IN BOW ARE FOR ONE (1) COLUMN ONLY.
TWO (2) KITS ARE REQD FOR A MECHANICAL UNIT.

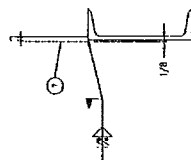
FORMULA TABLE	
IN.	DESCRIPTION
335	CHAIN LETH
	COL. HEIGHT (RND UP TO FT) * LOAD HEIGHT

2217-0XX-0

```

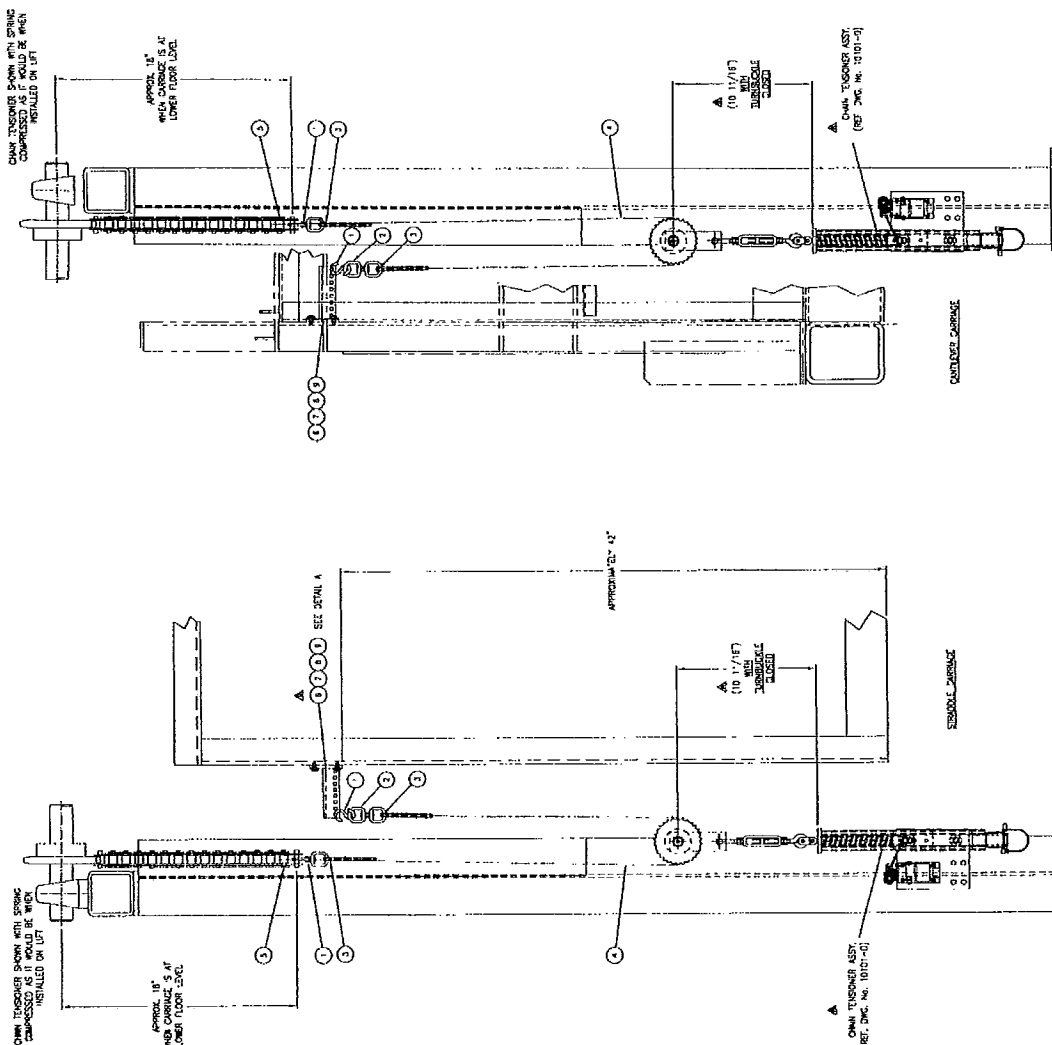
GSD = /60 2-JAN /J6C MASTER /JAN/
CBO = /80 2-JAN /J6C MASTER /JAN/
100 = /100 2-JAN /J6C MASTER /JAN/
120 = /120 2-JAN /J6C MASTER /JAN/
140 = /140 2-JAN /J6C MASTER /JAN/

```



NOTE: FIELD FIT TO PRESENT ON REAR SIDE OF CARRIAGE
USE 42" APPROXIMATE LOCATION.

Y 74:36

[illegible]

PFL-2302

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. If CHAINS are stored for an extended period of time or in a corrosive environment, they may need to be dipped in a non-detergent oil to retain their original condition.
2. SPROCKETS should 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. With the vent plug installed in the reducer, the drive base will need to have the motor/brake powered with temporary power of the correct voltage and the correct brake wiring configuration. This will rotate the drive shaft and cycle the brake once. The brake should also be cycled manually several times using the lever on the side of the motor. After rotating with temporary power, the vent plug should be removed and the original 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.
7. PARTS CRATE must remain sealed and dry.

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.

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.

Warranty

PARTS

StructureLifetime
Manufactured Components.....One Year
Purchased ComponentsOne Year

LABOR

StructureLifetime
Manufactured ComponentsOne Year
Purchased Components90 Days

The Small Print

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.

We, the manufacturer, sincerely hope that you do not experience problems with the equipment. If you do, the following procedures should be followed:

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 from 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 problem;
 - Pflow serial number;
 - Labor hours per problem;
 - Rate per hour;
 - Travel time incurred;
 - Date work was performed;
 - Copies of receipts for materials purchased locally or labor subcontracted.

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 on-site repair time as determined by Pflow Industries.

Installation Questionnaire

We want to provide equipment that is built correctly and shipped complete. To achieve that, we need to know what errors are being made or what field problems you are experiencing. Please answer the following questions and return this form to the Product Support Department at Pflow Industries, Inc. If more space is required for comments, please use the reverse side.

1. Was the unit received in good condition? Yes / No

If not, please describe damage:_____

2. Was the unit received complete? Yes / No

If not, what was missing?_____

3. Was the lift manufactured correctly? (Did it match the GA drawing?) Yes / No

If not, please describe the errors:_____

4. Did the unit (i.e., lift, gates, enclosures) fit? Yes / No

If not, please describe in detail the problem areas:_____

5. Did you return after the electrical was completed 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 electrical problems that you were aware of?

Was there a problem with the components? Yes / No

If yes, please describe:_____

Was there a problem with the field wiring? Yes / No

If yes, please describe:_____

6. Did you test the unit to full capacity? Yes / No

7. Did you test all gates to make sure that the unit does NOT operate if they are open? Yes / No

8. At each level, when the carriage is NOT present, can you open the gate? Yes / No

Comments:_____

Pflow Job #:_____ Customer/User:_____

Questionnaire Completed By:_____ Date:_____

Company:_____ Phone:_____

PFLOW INDUSTRIES, INC., 6720 North Teutonia Avenue, Milwaukee, WI 53209

Phone (414) 352-9000; Fax (414) 352-9002; 041406

Acceptance Certification

We accept this equipment as being properly installed, tested, and performing to our satisfaction. This form covers both the mechanical and electrical installation of the equipment and is for the purpose of quality assurance by Pflow Industries, and in no way releases either Pflow Industries, Inc. or the installing contractor(s) of their warranty obligations. If there are any exceptions or unresolved items, please note.

JOB NO.: _____ **JOB NAME:** _____

Site Mailing Address: _____

City, State, Zip Code: _____

On-Site Contact for future follow-up:

Name: _____ Title: _____

Phone: (____) _____ - _____ Ext. _____

Tests Successfully Performed: _____ Load test at _____ % of capacity _____ Operation
_____ Gate/Interlock Operation Other: _____

Personnel Instructed on the Operation:

Name: _____ Company: _____

Name: _____ Company: _____

ACCEPTED BY:

Name: _____ Name: _____

Title: _____ Title: _____

Company: _____ Company: _____

Phone: _____ Phone: _____

PFLOW PERSONNEL / REPRESENTATIVE / INSTALLER PRESENT:

Name: _____ Company: _____

Please return a copy of this form to the Product Support Department.

PFLOW INDUSTRIES, INC., 6720 North Teutonia Avenue, Milwaukee, WI 53209
Phone (414) 352-9000; Fax (414) 352-9002; 040199

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 OSHA PEL OSHA PEL	300 PPM 300 PPM 400 PPM STEL	12 mm
9	108-88-3	Toluene ACGIH TLV OSHA PEL OSHA PEL	20 PPM 100 ppm (Skin) 150 ppm (Skin) STEL	22 mm
4	100-41-4	Ethylbenzene ACGIH TLV OSHA PEL OSHA PEL	20 PPM 100 PPM 125 PPM STEL	7.1 mm
22	1330-20-7	Xylene ACGIH TLV ACGIH TLV OSHA PEL OSHA PEL	100 PPM 150 PPM STEL 100 PPM 150 PPM STEL	5.9 mm
24	67-64-1	Acetone ACGIH TLV ACGIH TLV OSHA PEL	500 PPM 750 PPM STEL 1000 PPM	180 mm
4	110-19-0	Isobutyl Acetate ACGIH TLV OSHA PEL	150 PPM 150 PPM	12.5 mm
1	108-65-6	1-Methoxy-2-Propanol Acetate ACGIH TLV OSHA PEL	Not Available Not Available	1.8 mm
3	112926-00-8	Amorphous Precipitated Silica ACGIH TLV OSHA PEL	10 mg/m3 as Dust 6 mg/m3 as Dust	
2	14807-96-6	Talc ACGIH TLV OSHA PEL	2 mg/m3 as Resp. Dust 2 mg/m3 as Resp. Dust	
4	13463-67-7	Titanium Dioxide ACGIH TLV OSHA PEL OSHA PEL	10 mg/m3 as Dust 10 mg/m3 Total Dust 5 mg/m3 Respirable Fraction	
0.3	1333-86-4	Carbon Black ACGIH TLV OSHA PEL	3.5 MG/M3 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 1 °F TCC	LEL 0.9	UEL 13.1	FLAMMABILITY CLASSIFICATION RED LABEL -- Extremely Flammable, Flash below 21 °F (-6 °C)
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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	Less Water and Federally Exempt Solvents
3.52 lb/gal	422 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."

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/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	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
*for Chemical Emergency ONLY (spill, leak, fire, exposure, or accident)	

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		7.1 mm
		ACGIH TLV	20 PPM	
		OSHA PEL	100 PPM	
		OSHA PEL	125 PPM STEL	
7	1330-20-7	Xylene		5.9 mm
		ACGIH TLV	100 PPM	
		ACGIH TLV	150 PPM STEL	
		OSHA PEL	100 PPM	
		OSHA PEL	150 PPM STEL	
2	64742-95-6	Light Aromatic Hydrocarbons		3.8 mm
		ACGIH TLV	Not Available	
		OSHA PEL	Not Available	
2	95-63-6	1,2,4-Trimethylbenzene		2.03 mm
		ACGIH TLV	25 PPM	
		OSHA PEL	25 PPM	
35	67-64-1	Acetone		180 mm
		ACGIH TLV	500 PPM	
		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.

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.

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**

-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 LEAK 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 incite cans. Do not stick a pin or any 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.

Material Safety Data Sheet

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.

Material Safety Data Sheet

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

Material Safety Data Sheet

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
Respiratory Protection**

- : Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.
- : 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

Material Safety Data Sheet

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/m ³ 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 mm ² /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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Material Safety Data Sheet

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.

Product Name: MOBILGREASE XHP 222 SPECIAL
Revision Date: 15Apr2009
Page 1 of 9

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 GALLOWES 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

Page 2 of 9

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
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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
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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.

Product Name: MOBILGREASE XHP 222 SPECIAL

Revision Date: 15Apr2009

Page 3 of 9

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.

Product Name: MOBILGREASE XHP 222 SPECIAL

Revision Date: 15Apr2009

Page 4 of 9

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
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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

Product Name: MOBILGREASE XHP 222 SPECIAL

Revision Date: 15Apr2009

Page 5 of 9

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

<u>Route of Exposure</u>	<u>Conclusion / Remarks</u>
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.

Product Name: MOBILGREASE XHP 222 SPECIAL

Revision Date: 15Apr2009

Page 6 of 9

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

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

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.

Product Name: MOBILGREASE XHP 222 SPECIAL

Revision Date: 15Apr2009

Page 7 of 9

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

Product Name: MOBILGREASE XHP 222 SPECIAL

Revision Date: 15Apr2009

Page 8 of 9

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

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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Product Name: MOBILGREASE XHP 222 SPECIAL

Revision Date: 15Apr2009

Page 9 of 9

Internal Use Only

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

PPEC: A

DGN: 2006163XUS (550276)

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