

PFLOW VERTICAL LIFTS

The Nation's Largest Manufacturer of Vertical Lifts

PFlow
Industries, Inc.



INSTALLATION INSTRUCTION MANUAL

SERIES F

Read this manual in its entirety and verify job site dimensions against the general arrangement drawing before starting this installation.

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. This manual is protected by U.S. Federal Copyright laws© PFlow Industries, Inc. No part of this manual may be duplicated or transcribed in any form without expressed written permission from PFlow Industries, Inc.

System Modifications/Disclaimer

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

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Technical Bulletins - by bulletin number

Bi-Parting Swing Gate Installation Instructions	15709-0002	B129
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Electrical Overview	15709-0006	B154
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Material Safety Data Sheets - MSDS

MANUFACTURER'S NAME	PRODUCT NAME	PRODUCT NUMBER	PFlow MSDS Bulletin
THE SHERWIN-WILLIAMS COMPANY	Fast Dry Acrylic Enamel, FDA PFlow Blue VOC	F78XXL13851-4357	15713-0011
THE SHERWIN-WILLIAMS COMPANY	Universal Primer, White B50-WZ1	B50XXW10463-4357	15713-0012
THE SHERWIN-WILLIAMS COMPANY	PFlow Blue Aerosol Spray Cans	F78XXL13851-4357 2871-0003	15713-0013
SOPUS Products	Shell Omala S2 G 220 Gear Lubricant	-	15713-0018
EXXON MOBIL CORPORATION	MOBILGREASE XHP 222 SPECIAL Grease	2015A0202531, 530550-00, 97G870	15713-0008

BILL OF MATERIAL SHEETS

Jxxxxx-0100 Lift Assembly

Jxxxxx-0400 Full Height Enclosure

JOB DRAWINGS

Part Number	Description	Rev.
Jxxxxx-VSP	VRC Specifications	
Jxxxxx-GA	GA Drawings	
Jxxxxx-0201	KD Carriage	
Jxxxxx-0400	Full Height Enclosures	
Jxxxxx-2001	Bracing Drawing	
Jxxxxx-0050	Electrical Schematic	
Jxxxxx-0301	Electrical Components	

SAFETY OVERVIEW

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

DANGER

When you see this symbol, it means that serious injury or death will occur if instructions are not properly followed.

WARNING

When you see this symbol, it means that personal injury will occur if directions are not followed carefully.

CAUTION

When you see this symbol, it means that personal injury and/or damage to the equipment may occur if directions are not followed.

NOTICE

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

SAFETY LABELS

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. A Vertical Reciprocating Conveyor (VRC) is not made for transporting people.

 **DANGER**

DO NOT exceed the rated lift capacity!

ELECTRICAL SAFETY PRECAUTIONS



Never assume that any circuit is safe to work on until you are sure that it is de-energized. Make sure that it cannot be accidentally re-energized after you begin working on it. Follow your facility or OSHA Lockout/Tag Out (LOTO) procedures ANYTIME maintenance or service is being performed on any electrical box or component. Affix a lock and warning tag on disconnects, breakers, and/or pulled fuses to alert others!

See PFlow Industries, Inc. technical bulletin 15709-0051, "Electrical Safety Precautions" to review electrical safety detail.

INTRODUCTION

Thank you for purchasing a PFLOW INDUSTRIES, INC., Series F Vertical Reciprocating Conveyor (VRC). 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. Call Pflow Industries for more information in the event an inspection is required for your equipment.

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 this manual. Prior authorization must be obtained from Pflow before commencing work of any kind.

Feedback - Let us know how we are doing. Each installation manual contains a questionnaire. 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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EQUIPMENT ARRIVAL AND UNPACKING

You will need a fork truck capable of lifting approximately 2,000 lbs. Larger units may require a higher lifting capacity fork truck. To ensure complete shipments, Pflow Industries takes pictures of the unit, contents of the parts crate, and individual boxes. See Figures 1-3.

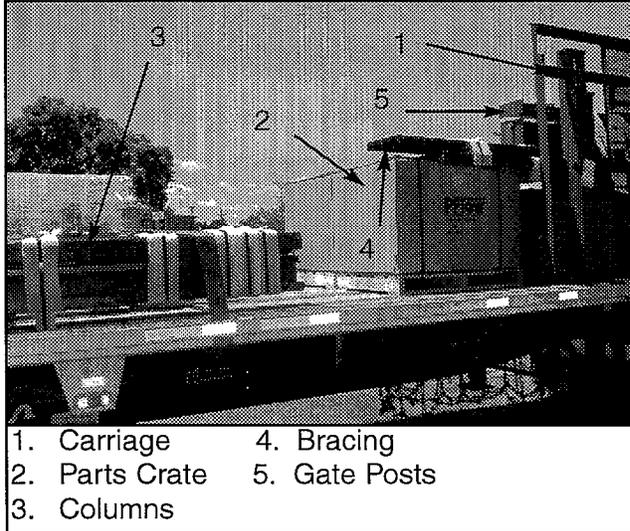


Figure 1

NOTE

The material in the boxes, cartons, etc. was loaded complete, in good condition and so delivered to the carrier agent.

Verify that the number of items on the Bill of Lading agrees with the number of items delivered to you. Check all pieces to determine if damage has occurred during transit. The carrier agent is responsible for, and should be notified immediately of, any visible loss or damage that has occurred. If damaged, the shipment must be signed for as such. Where loss or damage appears, call on the carrier agent to inspect the shipment before unloading it and make notation of condition of contents on freight bill. A claim for loss or damage should be presented to the carrier agent without delay, and a complete statement of facts should be in your possession. All hidden damage must be reported directly to the freight carrier within seven days of delivery. Pflow Industries is not responsible for shipping / receiving damage once the equipment has left the factory nor will we file any claims for damage that may occur.

If you believe anything is missing, contact our Product Support Department immediately. Failure to notify us may affect completion time of the installation. Our warranty does not cover lost time and/or additional trips for missing or damaged components.

All replacement components or labor that may be needed as a result of any damage will require a purchase order and compliance with our RGA procedures. This number should be obtained from Pflow Industries.

Figure 2 shows the typical contents of the parts crate.

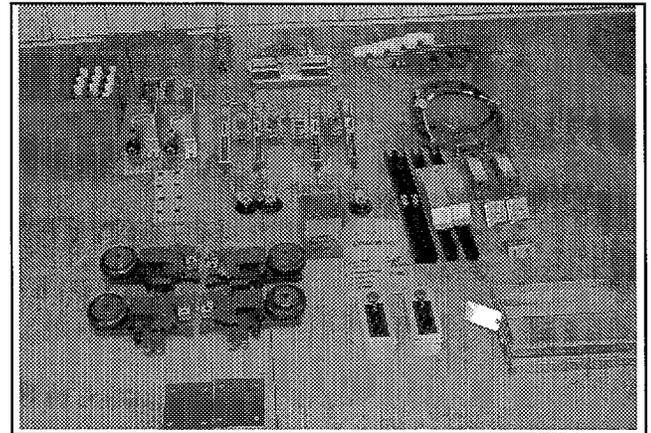


Figure 2

The shipping packet can be found inside the parts crate. This packet contains the owner's manual, these installation instructions, general arrangement drawing, a copy of the schematic, and additional information as may be applicable to the installation.

An additional copy of the schematic can be found inside the control panel. See Figure 3.

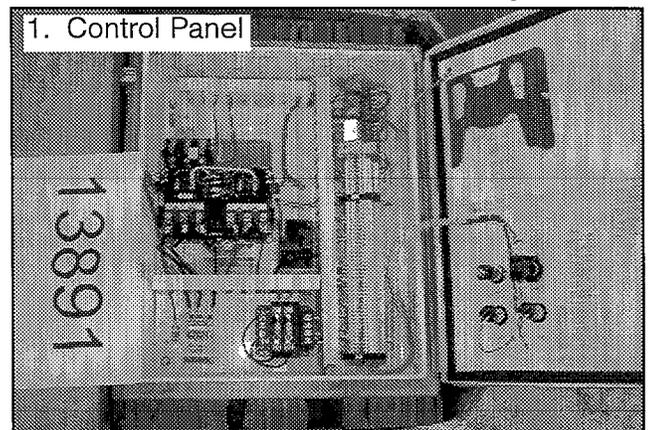


Figure 3

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PRE-INSTALLATION CHECKLIST

1. Site conditions can mean the difference between an installation that is smooth and one that is difficult.
2. We have provided a general checklist to help set up your installation. We recommend that the installer, or someone with installation experience, discuss not only these items but all other concerns directly with the people on site.
3. A pre-installation visit is always recommended and considered to be included in the responsibilities of the mechanical installer.



Safety should always be first and foremost in your mind on this or any job. Besides following safe working procedures, items required by OSHA may include: a hard hat, safety shoes, safety glasses and belt, fire extinguisher, and other safety equipment.

MECHANICAL INSTALLER RESPONSIBILITIES

1. Complete mechanical erection of the equipment as sold by PFlow, called out on the general arrangement (GA) drawing and in accordance with all instructions within this installation manual.
2. Return trip upon completion of the electrical installation for final checkout, adjustments and training. (See Completion Checklist).
3. On non-union sites, mounting of all electrical devices.

END USER AND/OR INSTALLER RESPONSIBILITIES

1. Unloading and transporting of the equipment to the installation area.
2. Storage (if applicable). If unit is stored indoors or long term storage is required, consult PFlow Industries for storage procedures required to keep warranty in effect.
3. All necessary site work to prepare for the installation such as pit, floor opening, adequate bracing locations, and shaftway openings.
4. Any site/building modifications necessary to get the equipment to the installation area.
5. Adequate pick points or lifting mechanism capable of lifting the heaviest load. If weight of load is in question, please call PFlow Industries.
6. Can the equipment pass through all doorways, hallways, etc.?
7. Can you use the customer's fork truck? Is the truck's lifting capacity sufficient?
8. Are safety meetings required?
9. Are there any work procedure/safety guidelines particular to the job site?
10. Is welding permitted? Is a "hot permit" required? Is a fire watch required?
11. Is there a pick point capable of lifting the necessary components?
12. What hours are you allowed to work on site?
13. Who is the authorized site contact?

Pre-Installation Checklist

14. Is this a union or non-union site?
15. Bracing requirements – Will additional materials be required?
16. Is temporary power available within 10 ft. of the unit?
17. Do you have a well-lit area to work in?
18. Is the installation area ready (pit complete, floor opening cut and/or finished, etc.)?
19. Are shaftway openings complete?
20. Are there any discrepancies between the site dimensions/application and the PFlow GA drawings? Has this information been provided to PFlow?
21. Will customer doors and/or shaftway openings be completed prior to equipment arrival?
22. Will other trades or in-plant production cause conflict with your proposed work schedule?
23. Special welding requirements if you have special coatings, i.e., epoxy paint, hot galvanized, etc.?

If you have any concerns or questions, please contact PFlow Product Support Department prior to start of work.

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SITE AND GENERAL ARRANGEMENT (GA) DRAWINGS

FREQUENTLY ASKED QUESTIONS

If you have any questions or concerns, please contact PFlow Industries, Inc. Product Support department prior to the start of the installation.

1	Are there any discrepancies between the site dimensions/application and the PFlow GA drawing. Has this been reported to PFlow?
2	What is the authorized site contact name and phone number?
3	What hours are you allowed to work onsite?
4	Are on-site safety meetings required prior to beginning installation?
5	Are there any work procedures and safety guidelines particular to the jobsite?
6	Is welding permitted? Is a "hot permit" required? Is a fire watch required?
7	Is this a union or non-union worksite?
8	Will other trades or in-plant production cause a conflict with the proposed installation schedule?
9	Can the equipment pass through all doorways, hallways, shaftway openings, etc.?
10	Is there a pick-point capable of lifting the necessary lift components?
11	Is the customer's forklift available? Do the lift components exceed the capability of the onsite equipment available to handle and lift the components?
12	Is the immediate lift installation area complete and verified for installation (pit complete and floor opening cut and/or finished)?
13	Are the shaftway openings and doorways complete or will they be finished after installation?
14	Has bracing locations and attachment points been approved on site? Is a job specific bracing drawing required? Will additional bracing materials be required?
15	Is temporary power available within 10 feet of the unit?
16	Is there enough lighting in the work area and/or lift shaftway?
17	Is there other non-PFlow equipment to be integrated with the PFlow lift components?
18	Are there special welding requirements (i.e. special coatings such as epoxy paint, hot dipped galvanized, etc.)?
19	Any local permits required before beginning installation?
20	At final equipment turn over will a local inspection and signoff be required?

Site & General Arrangement (GA) Drawings

SITE VS. GENERAL ARRANGEMENT DRAWING COMPARISON CHECK

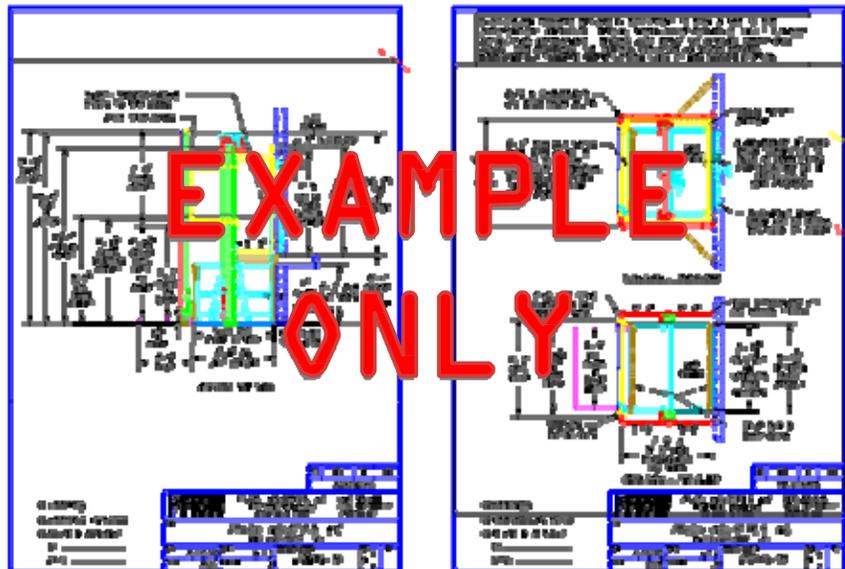
1. Check your shipment to make sure that nothing is damaged or missing. Missing components must be reported to PFlow Industries immediately per instructions in the introduction of the manual.
2. The shipping packet found inside the parts crate contains a copy of the general arrangement (GA) drawing.
3. Compare the dimensions as called out on the general arrangement drawing to actual site conditions. Report any discrepancies to PFlow immediately. The following are just a few of the dimensions that could become a problem if they do not match:
 - A. Pit Length
 - B. Pit Width
 - C. Pit Depth
 - D. Is the Pit Square?
 - E. Overhead Clearance
4. Are there any protrusions or rough spots in the floor level or wall space that could interfere with either the installation or operation?



CAUTION

Discrepancies between the general arrangement drawing and on-site conditions must be addressed immediately. Contact the PFlow Industries, Inc. Product Support Department for assistance.

Note: The drawing shown is an example and is not applicable to your unit. This is an example of what a General Arrangement drawing would look like.



If you have any questions or concerns, please contact our Product Support Department prior to start of work or at any time throughout the installation of this equipment.

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RECOMMENDED TOOLS

The following is a listing of recommended tools necessary to expertly install the equipment and perform up to industry standards. This is only a guideline. Individual sites and applications may require additional items as well. If there are any questions, regarding these items contact PFlow Industries, Inc.

<u>Recommended Tools</u>	
Welding Machine & equipment. (Helmet, Gloves, Rods)	Socket Set: ½ Inch Drive Sockets Sizes to 1-1/8 Inch Diameter
Cutting Torch with Tanks	Hammer Drill & Bits: (1/4, 3/8, ½ inch Anchors; 4 Inches-Minimum)
Fire Extinguisher	Electric Drill & Drill Bits
Fork Lift; 2,000 lb. Lifting Capacity (Minimum)	Extension Cords
Chain Fall: 2,000 lb. Capacity (Minimum)	Portable Light
Come-Along Tool	Sledge Hammer
Cables or Hook Chains 1,000 lb. Capacity (Minimum)	Allen Wrenches to 3/8 Inch
Disk Grinder	Open or Box-End Wrenches to 1-1/4 Inch
“C” Clamps	Chalk Snap-Line
Drift Punch	Plumb Bobs
5/8” – 11 NC Tap	Grease Gun
Carpenter’s Framing Square	25 Foot Measuring Tape
Four Foot-Long Level	Rags
SAE 30W Non-Detergent Motor Oil	Hack-Saw, Reciprocating Saw, or Portable Band-Saw



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Notes

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INSTALLATION INSTRUCTIONS

Carriage Placement

1. Check general arrangement drawing for construction. The unit was built using dimensions supplied to Pflow on the general arrangement drawing (floor-to-floor distance, pit depth, upper level opening, etc.). Contact Pflow Industries immediately concerning any discrepancies.

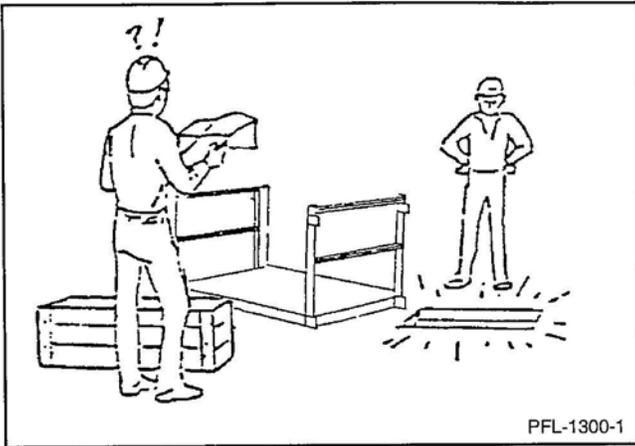


Figure 1

2. Lay out position of lift at second level opening. See Figure 2.

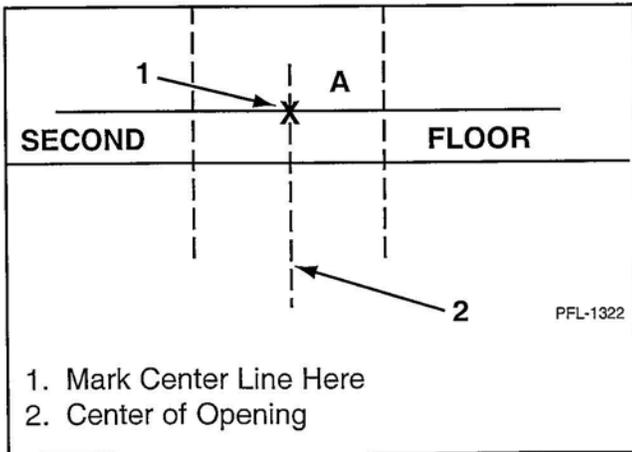


Figure 2

3. Drop line 1" away from upper floor on center line. One inch is a standard distance. Deviations may exist. Check GA drawing for special dimensions. See Figure 3.

CAUTION
If there are any protrusions (from floor, wall, etc.), they will have to be removed. Plumb lines have to be positioned beyond the protrusion or the carriage **WILL NOT** clear after installation. Floor may have to be extended to get the proper distance from floor to carriage.

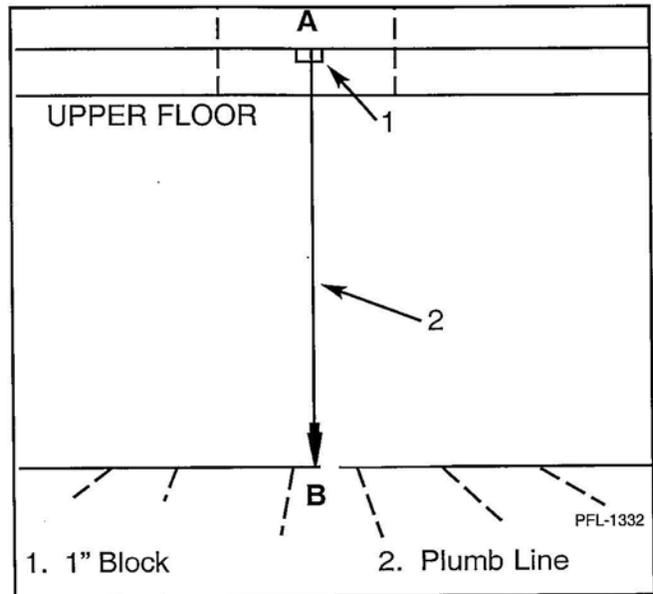


Figure 3

4. Mark tip of plumb bob clearly on the first floor. See Figure 4.

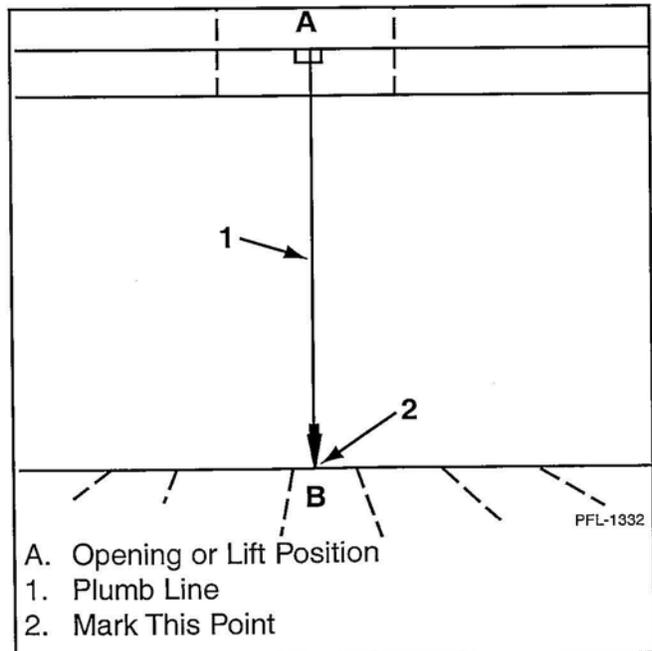


Figure 4

Installation Instructions

- Drop two points from upper level to lower level 12" from center line. See Figure 5.

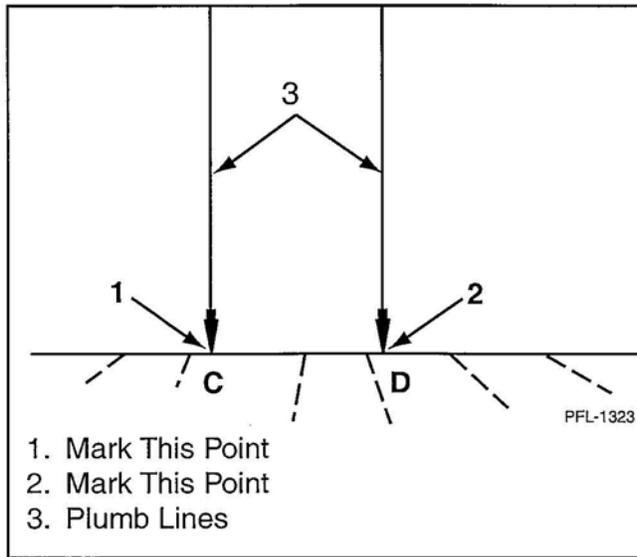


Figure 5

- Locate the three marks on the first floor. Using a chalk line, snap a line between C and D. Extend center line to front of carriage. See Figure 6.

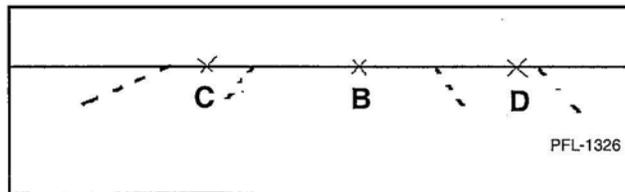


Figure 6

- Place carriage in position as shown on GA drawing. Align carriage on snap line and floor marks. See Figures 6 and 7.

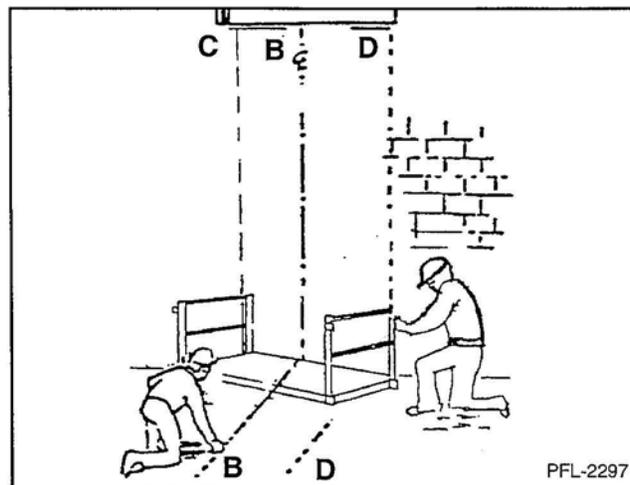


Figure 7

NOTE

Setting the carriage on blocks (example: 4" channel set on edge) will allow you to attach and adjust chain tensioner chains later on without waiting for power. Align carriage; level carriage, shimming if necessary; and temporarily secure carriage from moving. Weld to building structure or weld anchor tabs to carriage.

If carriage goes through a floor and clearances are tight, you might want to position the carriage AFTER the columns have been assembled and raised into place.

In some applications, taller units, spliced columns, restricted shaftways, etc., it may be necessary to raise the columns before positioning the carriage.

- IMPORTANT:** Each column must be correctly installed. There is only one right way. The front of the lift for orientation is as follows: The face of the column with the guide angle to the inside of the column should be positioned toward the front of the lift. The face of the column with the chain tube should be positioned toward the back of the lift. See Figure 8. (If you need to change the orientation because of site conditions, please call Pflow Industries.)

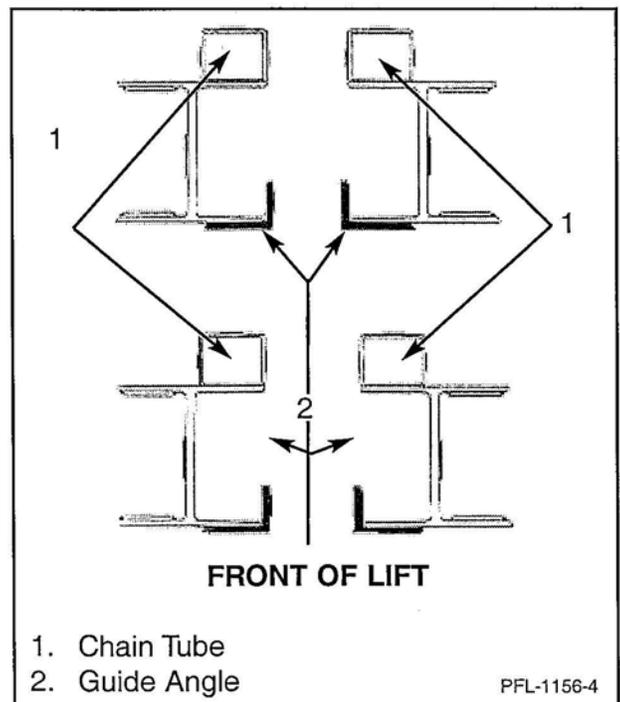


Figure 8

F Series

- If your VRC has spliced columns, refer to Bulletin 164-1 to 3, Spliced Column Assembly, NOW. If columns are not spliced, continue installing your VRC using the following instructions.
- Sprocket placement drawing shows view of lift from the top. The sprockets may or may not be pre-mounted to each column. If they are not mounted, bolt the column sprocket assembly to each column with the 3/4" hardware provided. Note that the near side column sprockets are assembled hub to hub and the far side column sprockets are not. See Figure 9.

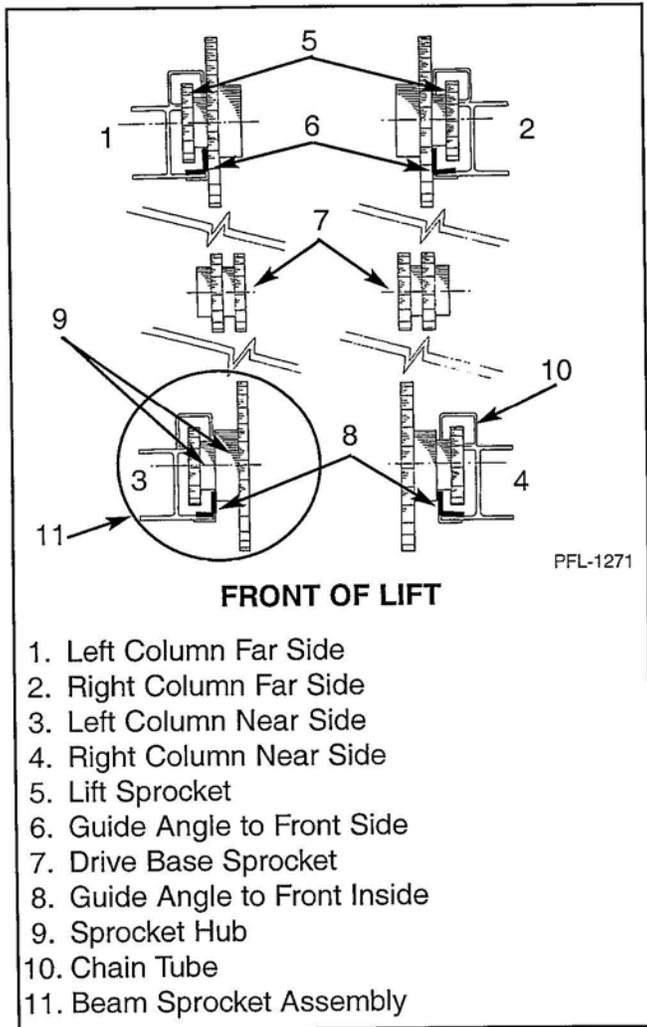


Figure 9

- If lift chains are pre-assembled on the column, make sure they are secured so when you raise the column they don't run off the sprocket. (Example: Putting screwdriver through link and spanning top of column.)

- Remove all 5/8-inch hex head screws from the four wheelblocks. Insert wheelblocks in the columns through the notch in the guide angle at the base of the column. See Figure 10.

Make sure masterlink clip in upper wheelblocks faces the carriage, not the inside of the columns. See Figure 10.

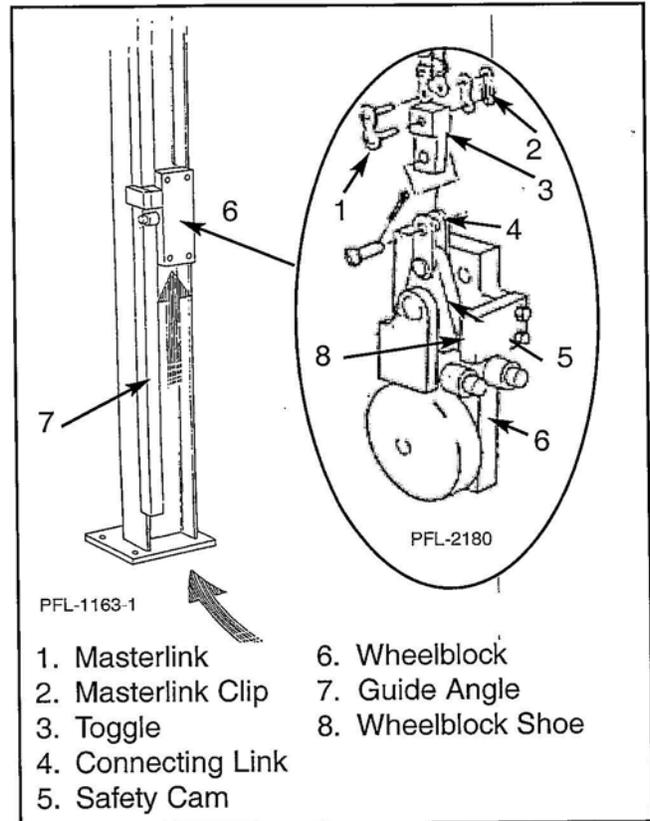


Figure 10

- Raise near side columns. Temporarily secure columns to prevent them from falling.
- Bolt 8" channel brace between columns at the top using 1/2" hardware, which consists of a bolt 1 3/4" long, nut, and lockwasher. See Figure 11.

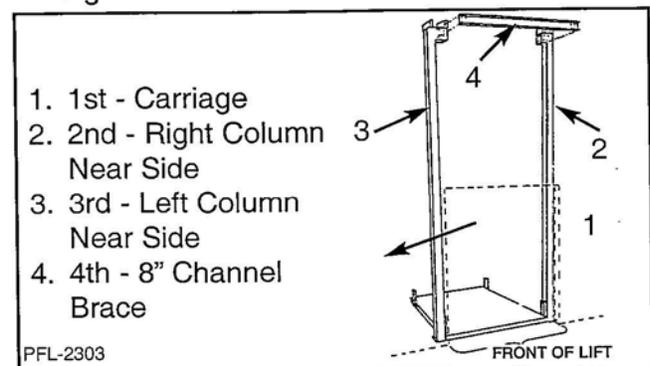


Figure 11

Installation Instructions

15. Bolt right side of the carriage upright to the wheelblock with 5/8" hardware provided. Repeat procedure for left near side beam. Do not forget to install the 1/8" wheelblock shims that are shipped loose. See Figure 12.

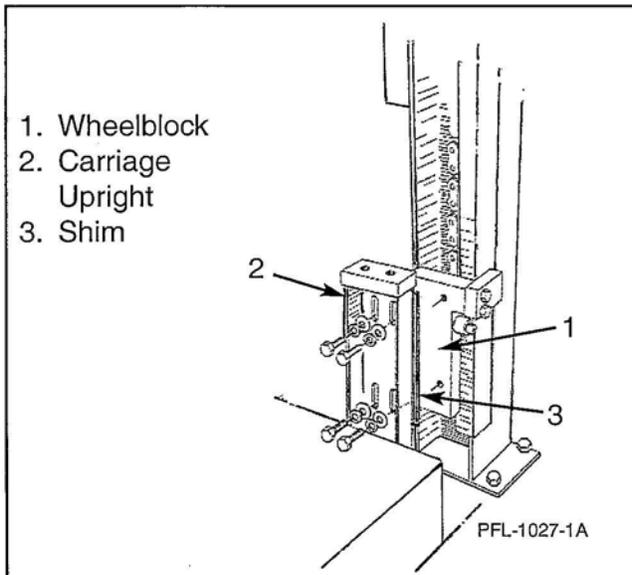


Figure 12

NOTE

Running a tap through all the threaded holes in the wheelblocks to clean them out should make bolting the carriage to the wheelblocks much easier.

CAUTION

Do not depend on carriage and wheelblocks to support columns!

It will help to leave the upper mounting bolt on the wheelblock(s) out (the one furthest away from the guide angle). Rotate the safety cam vertically, and stick a screwdriver through the carriage upright and the wheelblock bolt hole so the safety cam rests against the screwdriver. This will prevent the safety cam from rotating and engaging the column when you plumb the column.

NOTE

Be sure to remove the screwdriver and replace the mounting bolt before running the unit.

NOTE

Safety cam block should be installed at the middle of the slots in the upright.

16. You may plumb the columns in both directions at this time and weld off (see Step 21) or continue raising the other two columns.

17. Repeat Steps 8 through 16 on far side, right and left beams. See Figure 13.

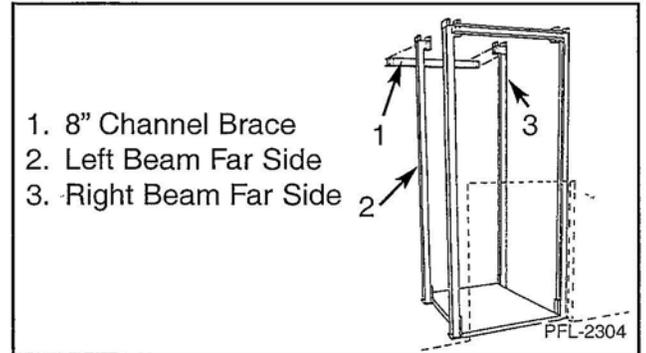


Figure 13

18. Bolt right channel brace and left channel brace in position with 1/2" hardware provided, which consists of a bolt 1 3/4" long, nut, and lockwasher.

NOTE

One chain sensor tower is lower than the other on both the right and left channel brace. It is important that the high tower is positioned towards the far side of the unit as illustrated. Notice the vertical channels are toward the inside of the lift structure.

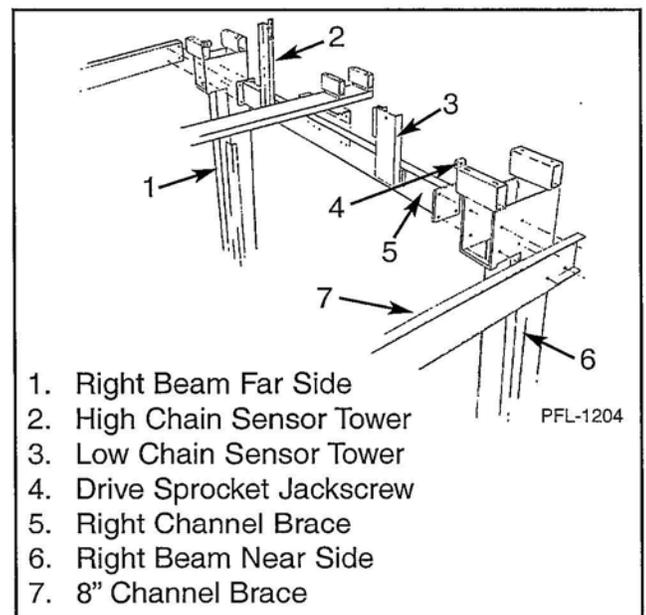


Figure 14

F Series

19. Raise drive base and set it in position. The motor should be facing the near side of the unit. See Figure 15.

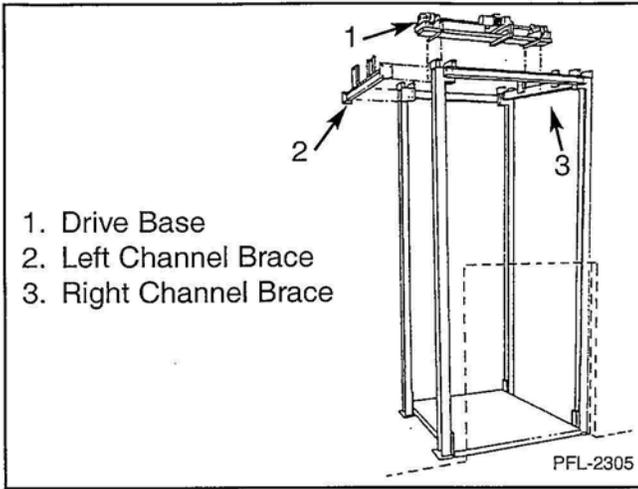


Figure 15

CAUTION

Extreme care should be observed when hoisting the drive base into position. Use nylon slings. Chains may slip or break without warning. Do not pick the drive base up by the shaft. If you must sling around the drive shaft, the sling should be located next to a pillowblock bearing or the gear reducer.

20. Line up the four mounting holes on the right and left channel braces with the holes in the drive base angle (at each end of the drive base). Bolt in position with 1/2" hardware provided, which consists of a bolt 1 1/4" long, nut, and lockwasher. See Figure 16.

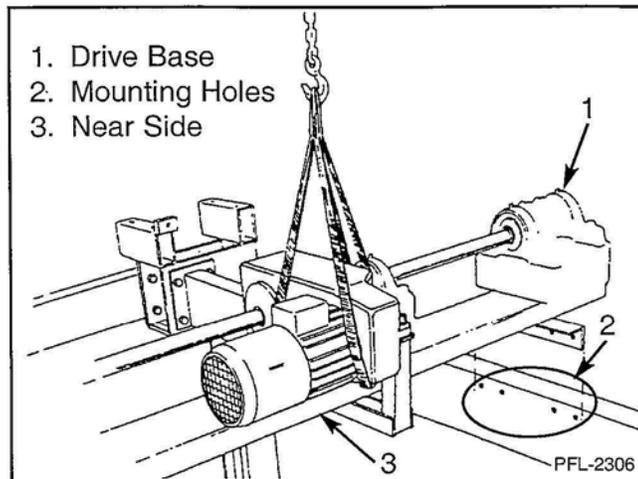


Figure 16

21. Plumb near side beams in both directions. You must maintain a 3/16" clearance between the wheelblock guide roller and the guide angle on the main beams. The guide angle-to-guide angle measurement should be given on the GA drawing. This dimension should be held between the guide angles on the near side and far side beams. See Figure 17.

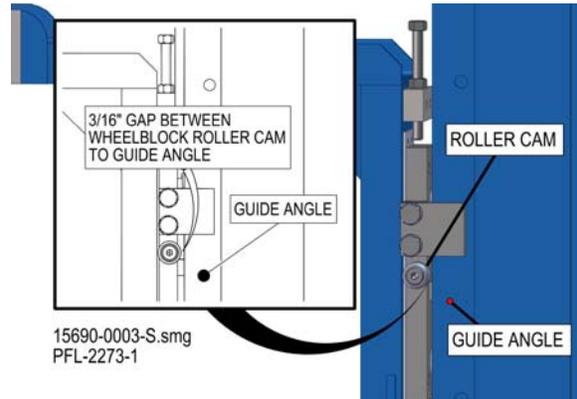


Figure 17

If this dimension is not given on the drawing, you can find it by: Physically measure across the carriage. Add 3" to this dimension. This is the correct guide angle-to-guide angle dimension. See Figure 18.

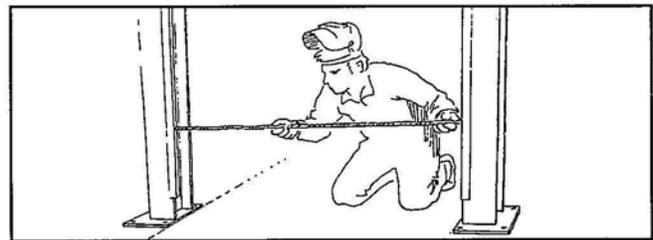


Figure 18

Example: Carriage is 8' from outside to outside of carriage upright. $8' + 3" = 8'-3"$ guide angle to guide angle.

Do not include (wheelblock shims).

22. Install brace (provided) at second floor. Tack weld only. See Figure 19.

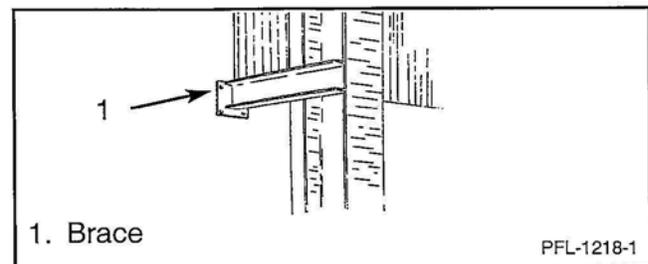
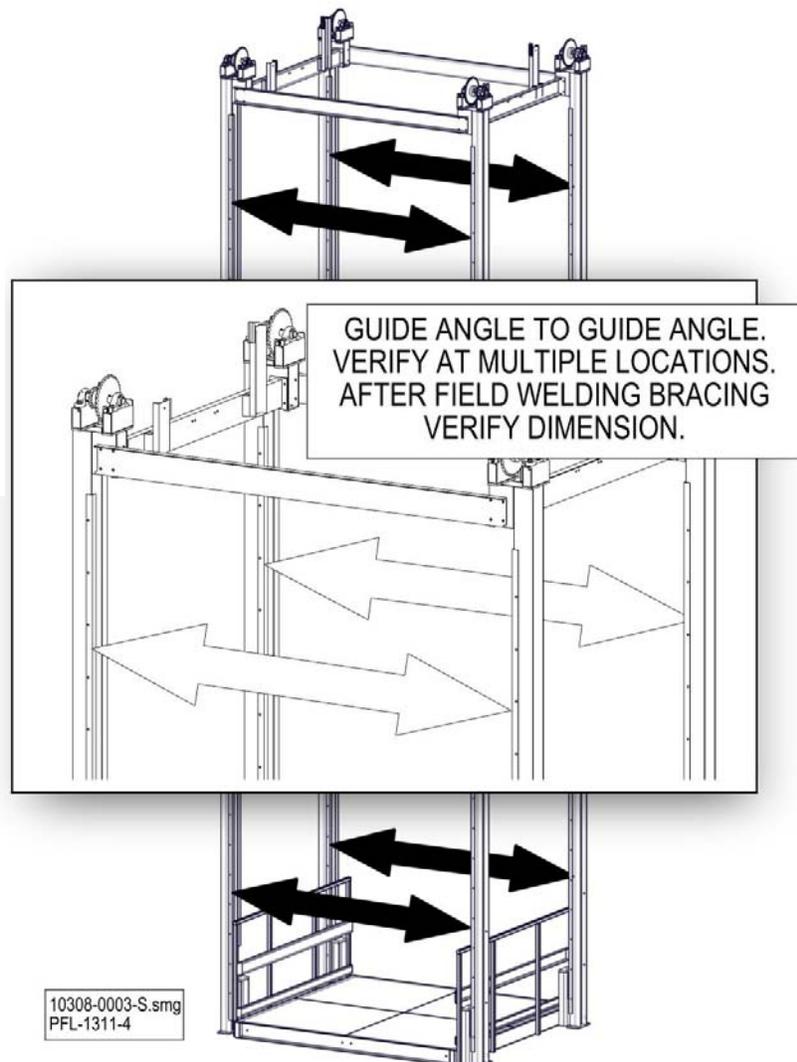
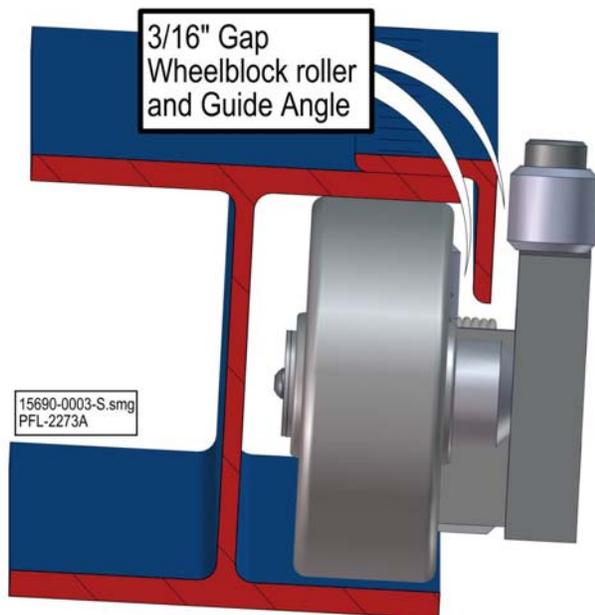


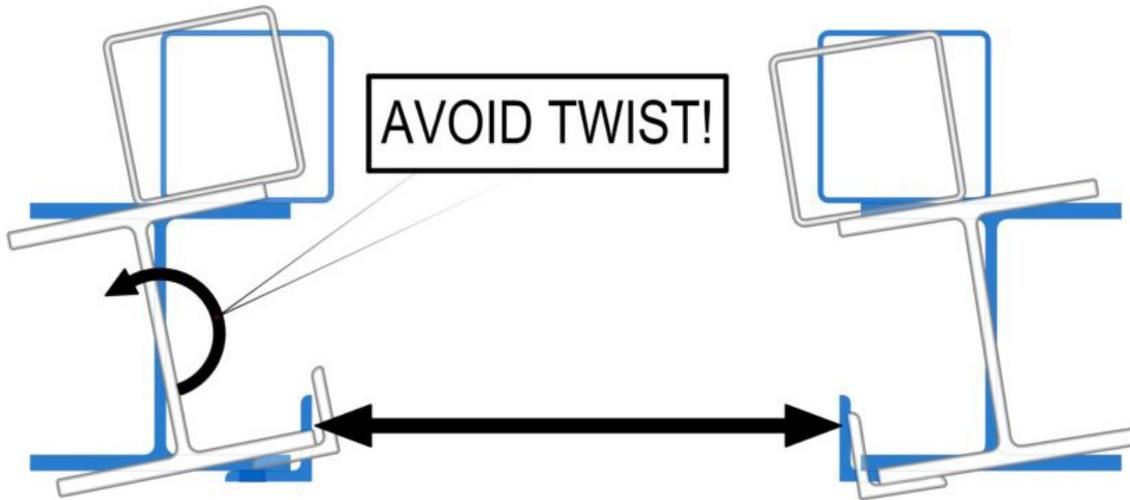
Figure 19

SETTING WHEELBLOCKS - GUIDE ANGLE

In aligning the guide angle to guide angle (see PFlow Industries, Inc. General Arrangement drawing) verify the 3/16" (+/- 1/16") gap between wheelblock roller and the guide angle. Too large or small and the carriage will "bind" on the guide angles.

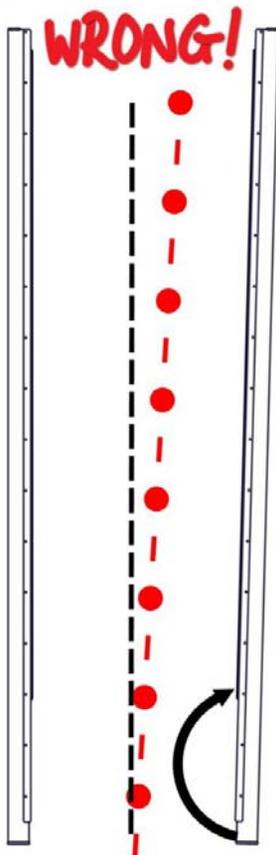
If the guide angle to guide angle is different than the dimension shown on the general arrangement drawing, add or remove a shim.





GUIDE ANGLE TO GUIDE ANGLE
AVIOD COLUMN TWIST!

10527-2800-S.SMG
PFL-1156-5



15027-2800-S.smg
PFL-1156-6

WRONG COLUMN ALIGNMENT
OUT-OF-PLUMB

IMPORTANT !



Column alignment is critical for proper carriage travel. Alignment between the column guide column angles must be checked during and after column installation.

VERIFY that the guide angles are parrallel and aligned between each other. Column twist needs to be avoided.

If there are field installation concern contact PFlow Industries, Inc. Service department.

Installation Instructions

23. Use minimum 3/8" x 3 1/2" Rawl-Stud type expansion bolts when anchor beam base plates are called out. Not provided.
24. Plumb far side beams. (Maintain 1/8" clearance as described in Step 21.) Check dimensions from near to far columns (see beam-to-beam dimension from GA drawing). Due to mill tolerances, this is an approximate dimension. If you are within 1/4" you should be okay. It is more important to have columns plumb. See Figure 20.

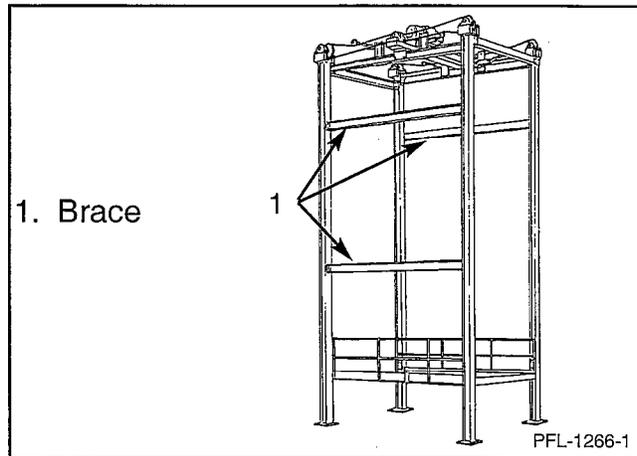


Figure 20

25. See GA drawing for position and number of braces necessary.

On units without decklocks or with pneumatic decklocks, install brace between right near side and right far side beams. Tack weld only. See Figure 21.

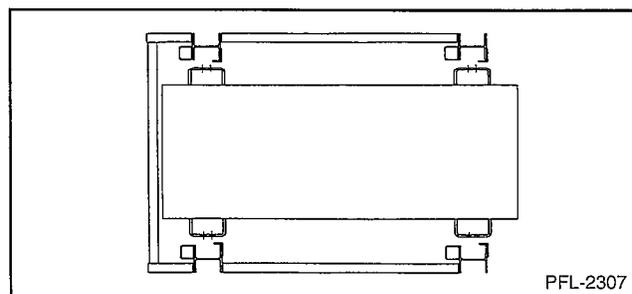


Figure 21

On units with manually actuated decklocks, install brace on outside of beams to allow decklock actuator to clear brace. Tack weld only. See Figure 22.

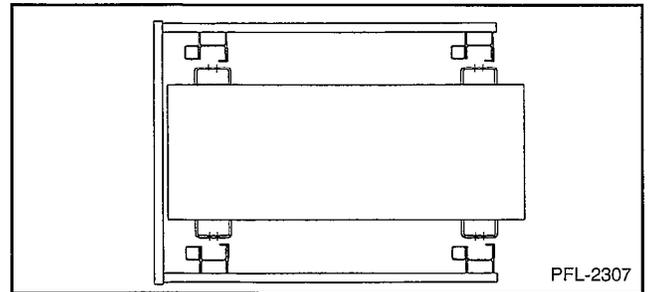


Figure 22

26. See GA drawing for position and number of braces necessary. Depending on the load and unload pattern, it is sometimes necessary to eliminate the near side stand-off brace. See Figure 23.

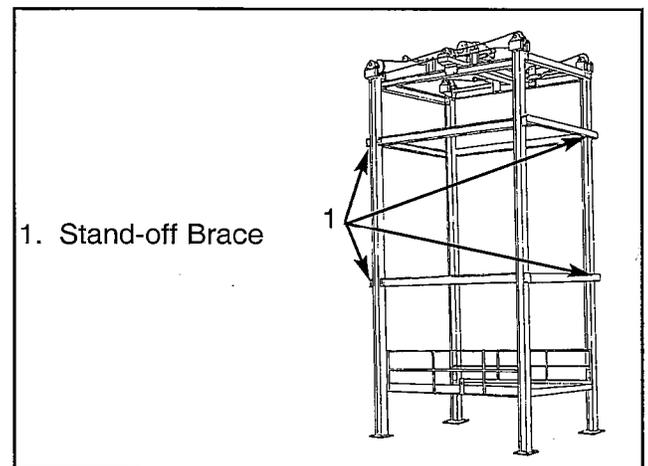


Figure 23

25. Before installing the drive chains, you must align the large sprocket on the columns with corresponding sprocket on drive shaft (straight edge recommended). You should check both far and near sprocket alignment before installing chains.

NOTE

Masterlink clips on chains should not face each other due to drive shaft sprockets being close together. (Masterlink pins may interfere with each other.)

CAUTION

Use extreme care when installing drive chains. The chains are heavy and oily, which may cause hand injury if you lose control of the chains.

F Series

Install drive chains as illustrated. Drive chains must be as tight as possible. A chain puller or stretcher is recommended. Chains are sent long. You may need to remove links. See Figure 24.

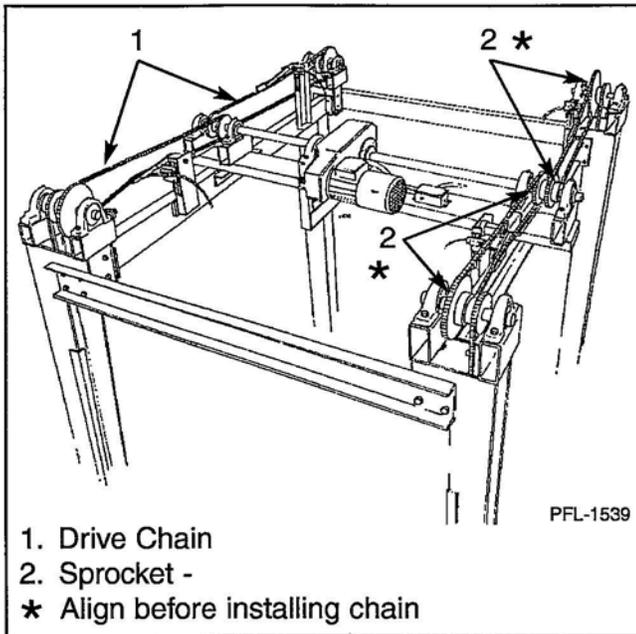


Figure 24

After drive chains are installed, you can remove anything holding the lift chains from falling. (This only applies if chain was installed prior to lifting column.) The motor brake will now hold sprockets from turning.

CAUTION

Use extreme care when installing lift chains. The chains are heavy and oily, which may cause hand injury if you lose control of the chains.

26. Remove chain jump guide. See Figure 24B.

Take a 10' section of the lift chain (larger chain) and install it over the sprocket on the column so that the end of the chain is just above the chain tube at the back of the column.

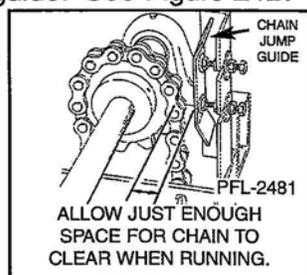


Figure 24B

At this time, adjust the sprocket so the chain goes down the center of the chain tube. Take the #35 chain and divide it equally into four sections (one for each column). Mount the swivel to one end of the #35 chain using the masterlink. See Figure 25.

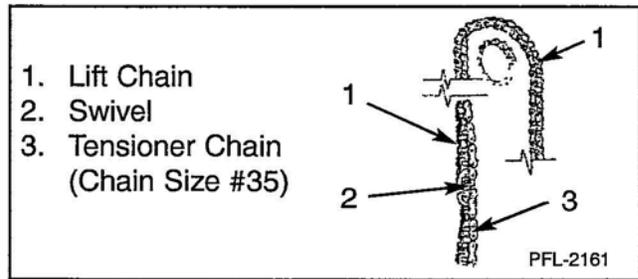


Figure 25

Carefully drop the #35 chain down the chain tube on the back of the column (drop the end without the swivel into the tube). Make sure the chain goes down without any knots or kinks. Attach the swivel to the masterlink on the lift chain.

Carefully jump the lift chain over the sprocket so that approximately 2' is down into the chain tube. Continue adding sections of the lift chain down the front of the column. (Make sure you have divided the chain into four equal lengths. It will usually be ten foot lengths with four smaller lengths, one for each column.) Attach the end of the chain to the wheelblocks. See Figure 26.

CAUTION

If chains don't reach the wheelblock, carefully jump the chain over the sprocket to reach. Do not put hands under the chain. Pull the chain from the side. If chain gets away, the weight will crush fingers. Do not allow chain to come off sprocket.

NOTE

With carriage at the first level, there should be at least 1' of lift chain over the top of the sprockets and into the chain tube.

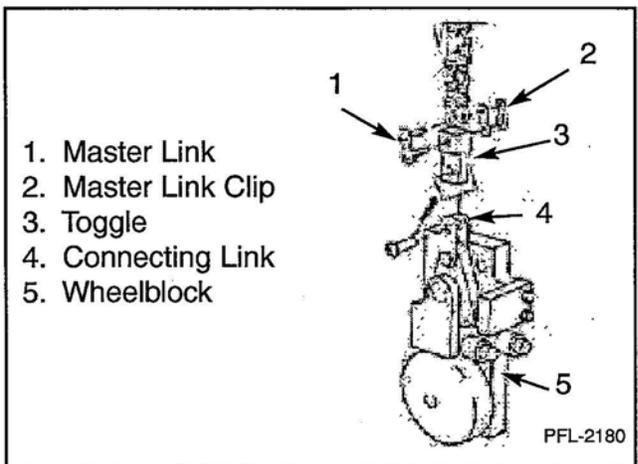


Figure 26

Installation Instructions

Continue with the other column.

After the chains are installed, try to get them approximately the same length by jumping the chain over the sprockets.

CAUTION

Again, be careful; the chain can crush your fingers between the chain and the sprockets.

Remove the blocks from under the carriage and remove the temporary anchors or welds holding the carriage secure. Carriage should now be hanging from the chains. Level the carriage (see page 17).

NOTE

If the carriage is not hanging freely from the chains, you will have to wait until you get power to raise the carriage slightly and then adjust the #35 tensioner chain and chain tensioner switch.

27. Reinstall chain jump guides. See Figure 24B.

Insert chain tensioner assembly into mounting tube near bottom of the columns. Notice that the limit switches are away from the carriage. See Figure 27.

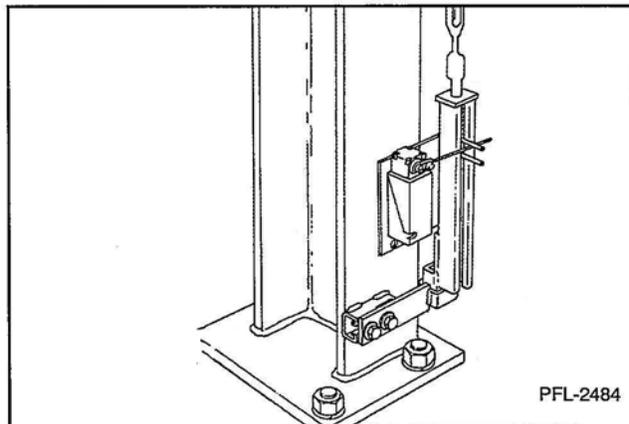


Figure 27

28. Bolt carriage jackscrew assembly to all four carriage uprights as illustrated. See Figure 28. (If you have decklocks or extra long uprights, you may not have standoffs or this style jackscrew assembly.) If standard options are not provided, see Figure 29.

NOTE

There are left hand and right hand standoffs.

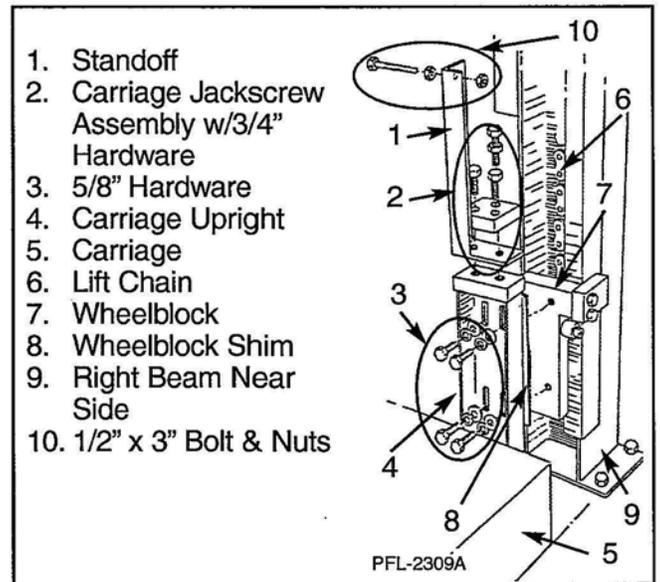


Figure 28

29. Level the carriage in both directions with a four foot level.

NOTE

Carriage must be level with an equal amount of tension on each lift chain.

All wheelblock mounting bolts must be loose while making this adjustment, and the carriage weight should be held by the 3/4 inch jackscrew. The wheelblock mounting bolts should be tightened after the adjustment is made.

30. Attach mounting bolt to 1/2 inch hole in the side of each standoff.

31. Thread the tensioner chain (one end is attached to lift chain) around the sprocket on the chain tensioner and back up to the wheelblock standoff. (Both eye bolts on the turnbuckle should be backed out to allow maximum adjustment.) Pull excess slack out of the tensioner chain, break chain, and fasten to swivel and S-hook on 1/2 inch bolt. See Figure 29.

*If carriage uprights are tall enough, the standoff angles may be omitted. You will then put the 1/2 inch x 3 inch bolt into the wheelblock attaching the swivel, S-hook and #35 chain there.

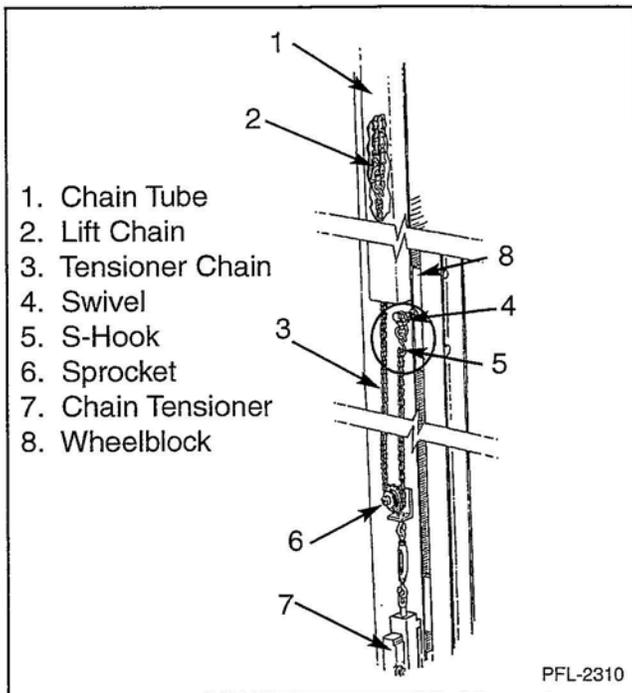


Figure 29

32. Take S-hook and swivel and place on bracket. See Figure 29. Place the #35 chain coming from chain tube around the sprocket and cut to length to meet the swivel. Attach to swivel.
33. If carriage is hanging free from lift chains, adjust turnbuckle (Figure 30) until limit switch rod arm is centered between the two roll pins on chain tensioner bracket. See Figure 27. (Limit switch arm should be parallel to ground when set.)

NOTE

If carriage is not hanging from lift chains, you will have to wait until unit can be bumped up by electrician to do above steps.

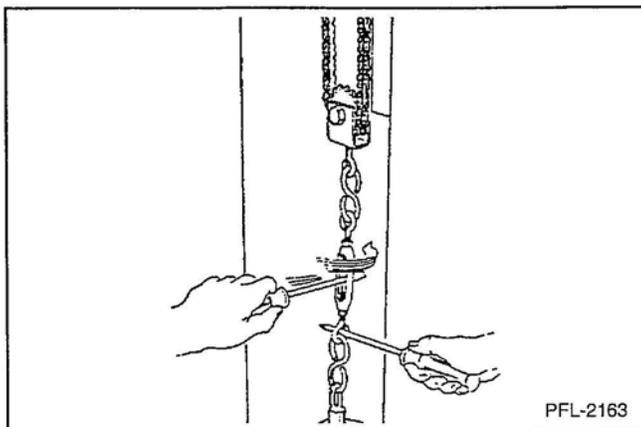


Figure 30

34. On tall units, the excess chain movement may cause the limit switch to activate prematurely. In these cases, move the lower roll pin to the lower hole in the chain tensioner block to allow for more movement in block. See Figure 31.

NOTE

Have the electrician "bump" the motor to check rotation. It is preferred that this be done before the drive chains are installed if an electrician is available.

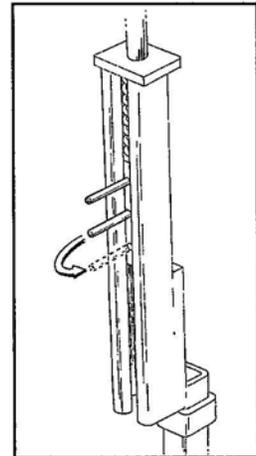


Figure 31

CAUTION

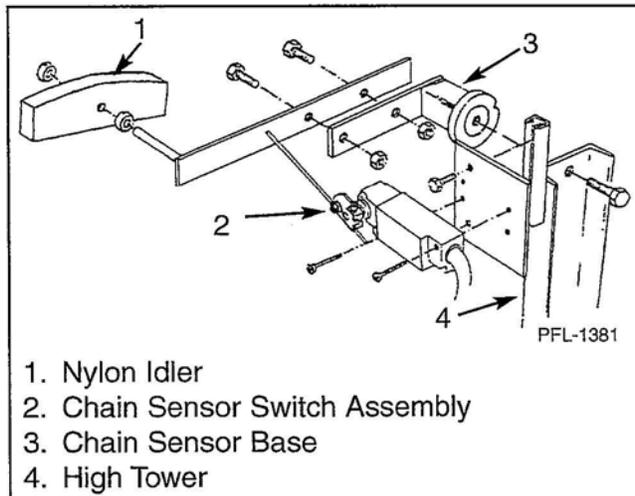
Do not allow the electrician to "run" the motor until rotation is verified as damage to the chain tensioner sheaves or cables is likely if the rotation is incorrect. The lift chain will also run off the sprockets.

⚠ WARNING

When running the unit before all limit switches are installed, be prepared to disconnect power. Allowing carriage overtravel in either direction can result in severe damage. The use of temporary power is not recommended for inexperienced installers.

35. Make sure carriage is free to rise 6". Check to make sure carriage is level and chains are equally tight.
36. Mount the chain sensor and switch assemblies to the chain sensor towers as illustrated. See Figure 32.

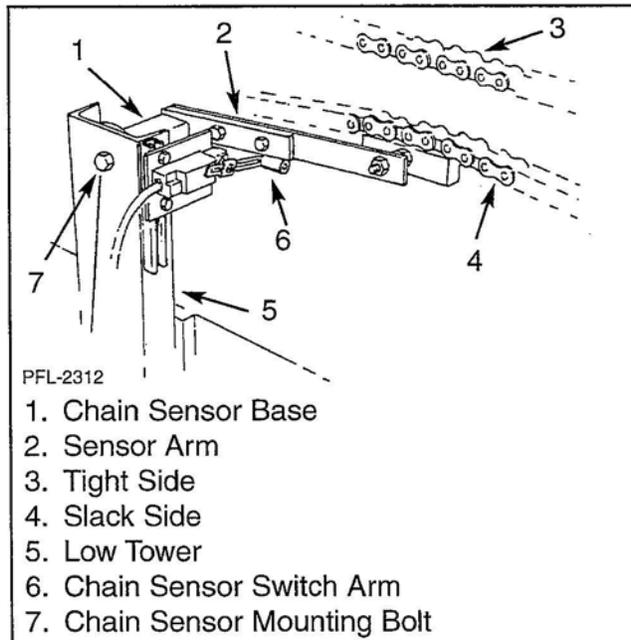
Installation Instructions



1. Nylon Idler
2. Chain Sensor Switch Assembly
3. Chain Sensor Base
4. High Tower

Figure 32

37. The nylon idler should be placed against the slack side of the drive chain. On the high tower, the slack chain is on top and the nylon idler should be situated over the chain and pressed down against it. On the lower tower, the slack side of the chain is on the bottom as illustrated. See Figure 33.



1. Chain Sensor Base
2. Sensor Arm
3. Tight Side
4. Slack Side
5. Low Tower
6. Chain Sensor Switch Arm
7. Chain Sensor Mounting Bolt

Figure 33

38. Adjust chain sensor tension. Loosen chain sensor mounting bolt slightly. Grasp the chain sensor base with a large adjustable wrench or pipe wrench and turn the base to take slack out of drive chains. See Figure 34.

NOTE

Adjust the sensor arm to at least 15° and up to 30° as indicated by the scale on the base. Make sure the limit switch is in tripped condition as it will return to a normally open condition if chain breaks.

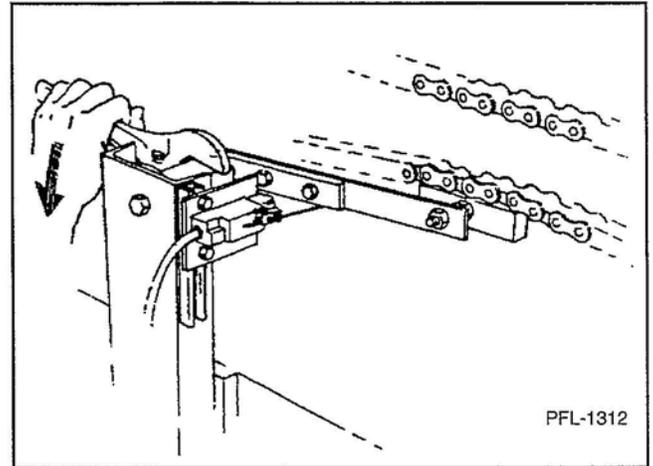


Figure 34

39. If possible, have the electrician run temporary power to the motor.
40. Have the electrician “bump” the motor to check rotation. (If an electrician is available, it is preferred that this be done before the drive chains are installed.)

CAUTION

Do not allow the electrician to “run” the motor until rotation is verified as damage to the chain tensioner sheaves or cables is likely if the rotation is incorrect. The lift chain will also run off the sprockets.

41. Having determined proper rotation, have the electrician “jog” the carriage up about one foot at a time. Check each wheelblock guide roller for the necessary 1/8” clearance. If the clearance is incorrect, recheck guide angle-to-guide angle dimensions and/or replumb the beams.

F Series

42. Install four diagonal braces across the channel braces at the top of the unit and weld into position. See Figure 35.

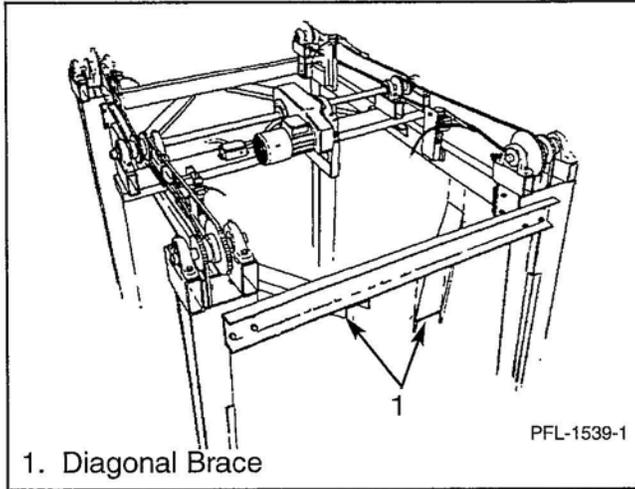


Figure 35

43. Full weld brace to second level.

44. Full weld all other braces and drive base mounting angle.

45. Install first level limit switch assembly as illustrated. See Figure 36.

NOTE

First level limit switch is actuated off the bottom of the carriage cam, and the second level limit switch is actuated off the top portion of that same cam. All level and overtravel limit switch mounting brackets (Uni-strut) should be field welded.

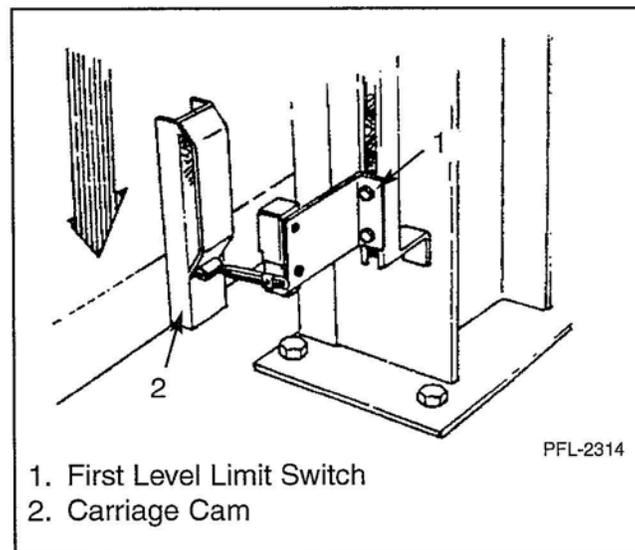


Figure 36

46. Install second level limit switch. See Figure 37.

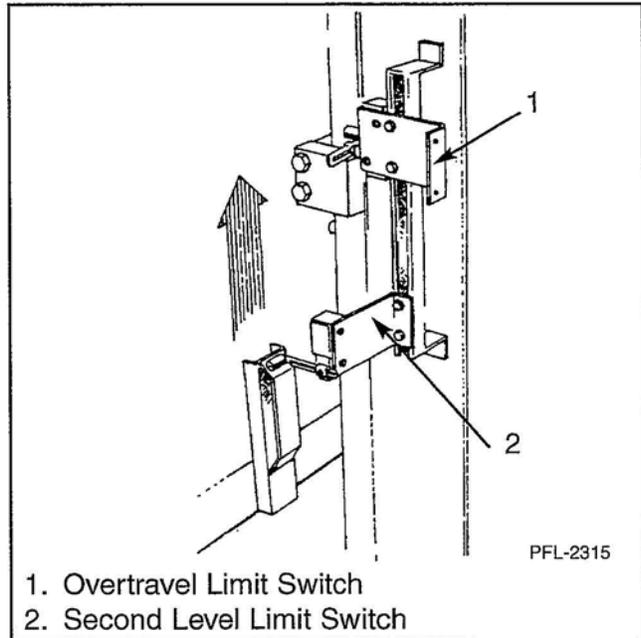


Figure 37

47. Install overtravel limit switch as illustrated. The overtravel limit switch bracket is the same as the level limit switch bracket but is positioned slightly different to allow this switch to be activated by the wheelblock shoe. The location of this switch should be such that it is just above the second level limit switch but will not activate unless the second level limit switch does not function and the carriage continues to go up. See Bulletin 188 for supplemental information. See Figure 38.

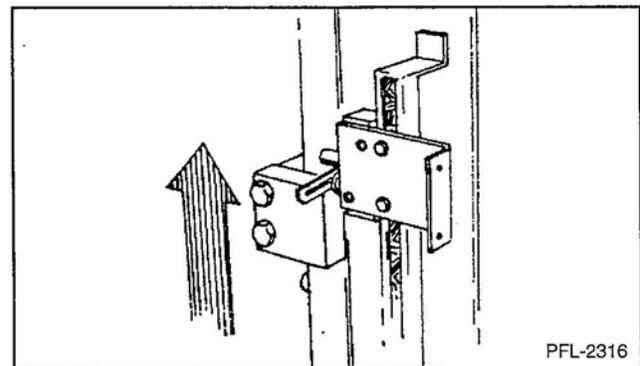


Figure 38

48. Clean welds and touch up paint.

Spliced Column Assembly Instructions

SERIES F

NOTE

COLUMNS ARE MARKED A, B, C, AND D. PLACEMENT OF THE COLUMNS IS NOT DETERMINED BY THESE MARKS. THE COLUMN LETTERS ARE ONLY USED TO CORRECTLY ASSEMBLE A SPLICED COLUMN. THE SPLICED PARTS OF THE COLUMN ARE LETTERED AS SHOWN IN FIGURE 1 AND BY THE CORRESPONDING LETTERS SHOWN IN FIGURE 2. SEE PAGE 13 IN THE SERIES F INSTALLATION INSTRUCTIONS MANUAL FOR CORRECT COLUMN PLACEMENT AND SPROCKET ORIENTATION.

Unband spliced column pieces. Locate the identification letters, which will be found on the column flanges 6" from the splice ends as shown in Figure 1.

1. Group the spliced column pieces by letters.

NOTE

Lift shown partially assembled to better depict the marking system. See Figure 1.

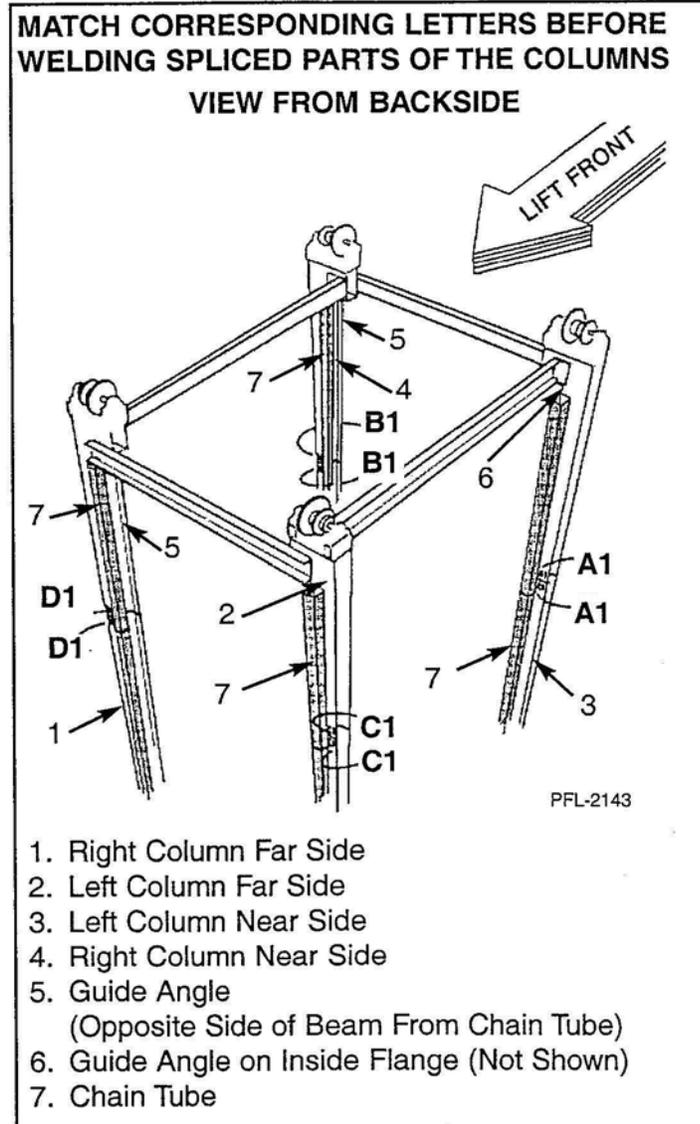


Figure 1

NOTE

If there are more than two spliced column pieces per column, see Figure 2 to determine placement of spliced pieces.

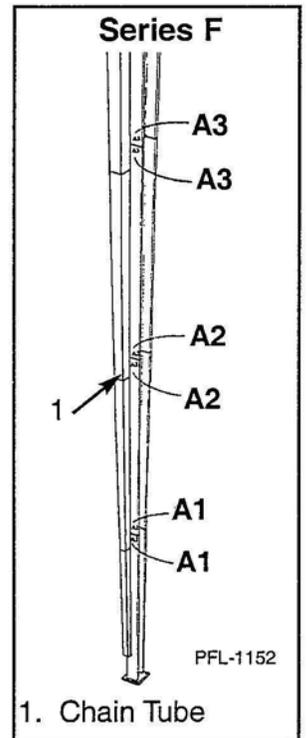


Figure 2

Assemble spliced column pieces as shown. Use 5/8" bolts and nuts (two per splice) to help hold and align each piece of the column. See Figure 3.

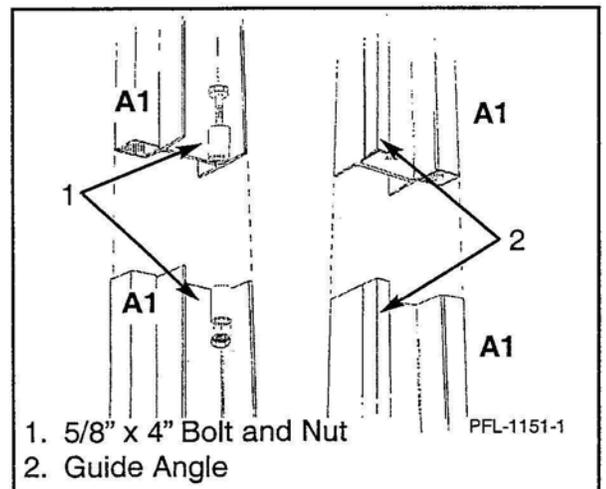


Figure 3

Spliced Column Assembly Instructions

Tack weld spliced column pieces together. The bolts alone are not strong enough to hold the column pieces together. Temporarily brace the column. Continue to bolt together and tack weld the rest of the column pieces keeping the column temporarily braced until it has been completed.

Assemble the rest of the columns in the same manner.

Proper alignment is CRITICAL to the installation and operation of your VRC. Use a string as shown to check alignment. Column has to be aligned from two directions. (See inset Figure 5.) Keep equal distance between the string and the guide angle down both column sections. See Figure 4.

⚠ WARNING

Column is shown unsupported for illustrative purposes only. Columns must be supported.

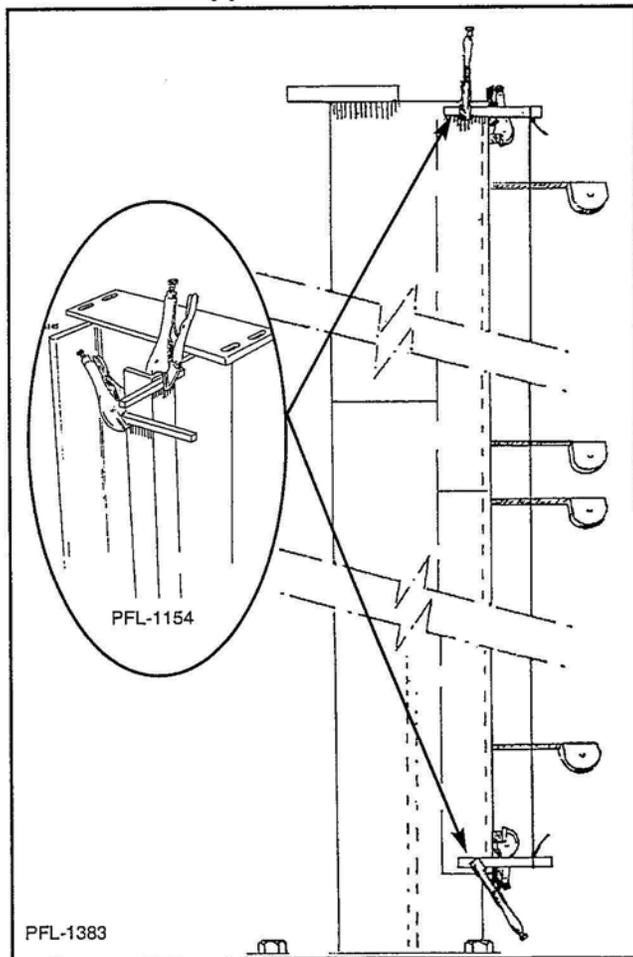


Figure 4

CAUTION

Too much heat introduced into the column will cause column twist. Weld in a manner to allow heat to dissipate.

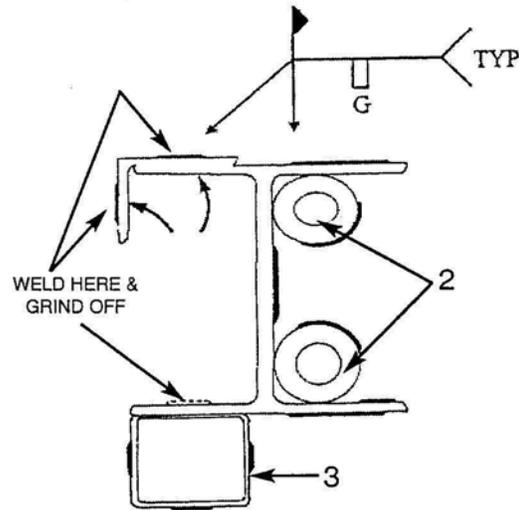
After columns are properly aligned, do the final welding and bracing of the spliced column pieces. Bolts do not have to be removed after final welding.

NOTE

Do NOT weld on the inside of the guide angle surface. It must be clear for the wheelblock to ride over it.

Weld the guide angle at the splice on the outside of the column and then grind it flat. Be sure to do short welds on the chain tube. The tube is thin, and you must be careful not to burn through the chain tube. See Figure 5.

MINIMUM E70 ELECTRODE MATERIAL REQUIRED (LOW HYDROGEN PREFERRED)



1. Inside of Guide Angle
2. Spliced Alignment Tubes
3. Chain Tube

Figure 5

Spliced Column Assembly Instructions

These instructions are very general due to variations in site construction, conditions, available installation equipment, installer's ability, and situations beyond Pflow Industries' control. Any variation that is safe and functionally correct for the equipment is acceptable.

If you have any questions or concerns, please contact the Product Support Department of Pflow Industries for assistance.

Return to Page 12, Item 10 of the F Series Installation Manual and continue installation of the VRC.

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ANCHORING AND BRACING

FINAL FIELD WELDING

1. A job specific bracing drawing may be provided. Verify drawing details prior to beginning field bracing work.
2. All field welding to be to latest edition of AWS D1.1.
3. Weld filler material to be minimum E60xx.
4. Prior to final field welding verify lift column and drivebase alignment.
5. Full weld support bracing at upper levels (unless shown otherwise).
6. Full weld all lift connections and drive base mounting angles.

GENERAL

NOTICE

The following illustration is for reference only. Site conditions may require a different alternative to the ones we suggest.

Side-to-side and front-to-back bracing of the unit is required. Seismic requirements will be different and a separate drawing is usually provided in the shipping packet. Bracing of the unit and enclosures is the responsibility of the installer.

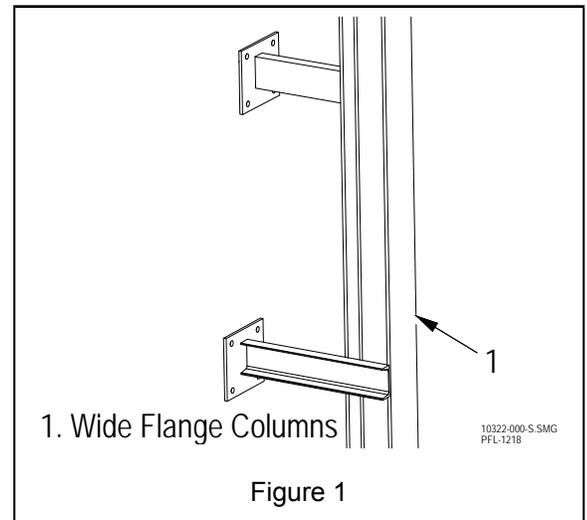
It is the customer's responsibility to make sure that the site conditions have a structure of adequate strength for bracing in order to withstand the forces.

For a two-level unit, Pflow will supply:

- (2) 10' lengths of 4" channel (unpainted)
- (2) 4-hole pads (unpainted)
- (1) 10' length of 1½" x 1½" x 3/16" angle per gate (unpainted)
- (2) cans of spray paint

Each additional level will be supplied with the following:

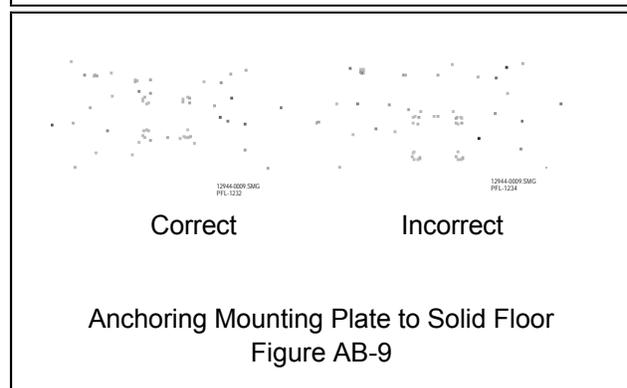
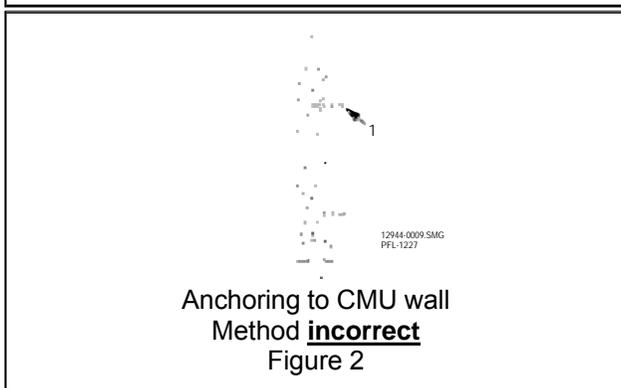
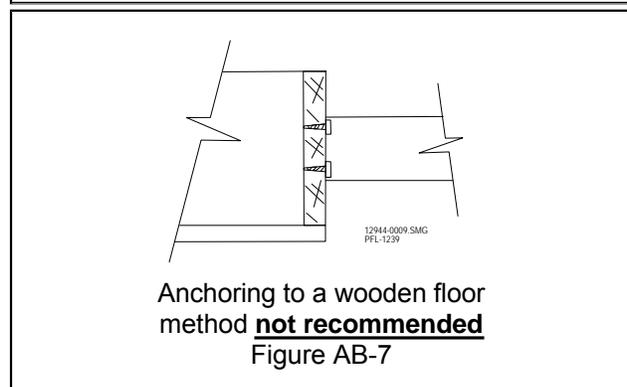
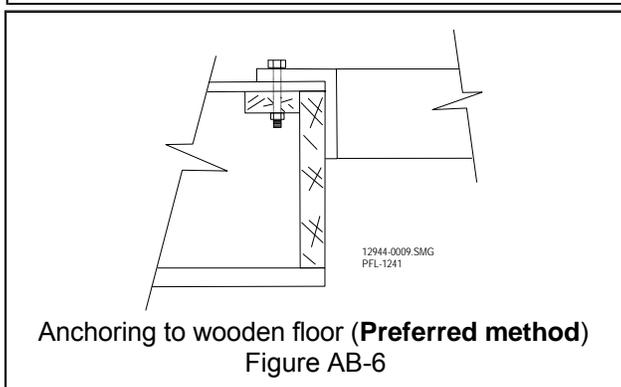
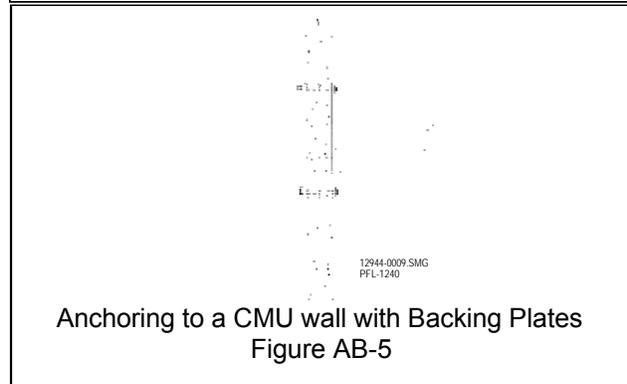
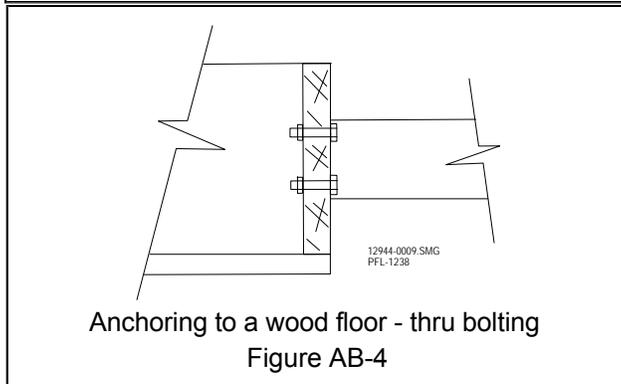
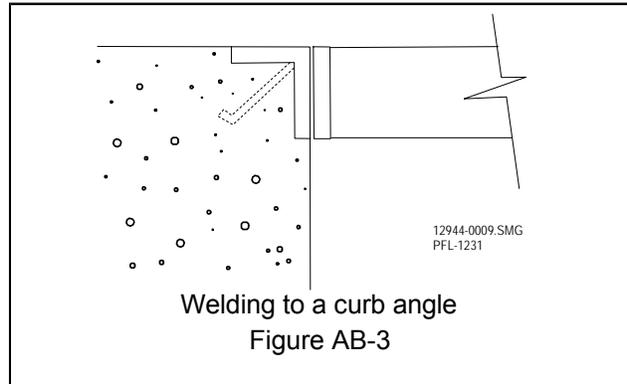
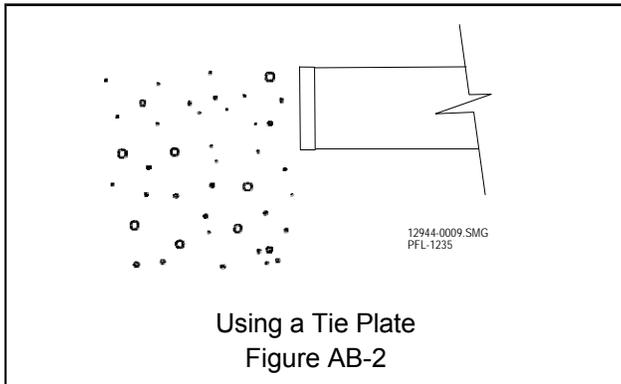
- (1) 10' length of channel
- (1) 10' length of angle per gate
- (2) 4-hole pads



PFlow does not supply anchor bolts nor guarantee that the above material will be sufficient for the application.

It is the installer's responsibility to check the information included in the shipping packet prior to commencing work. Specific bracing instructions may be provided and/or required.

ANCHORING GUIDELINES



ELECTRICAL SAFETY PRECAUTIONS



Never assume that any circuit is safe to work on until you are sure that it is de-energized. Make sure that it cannot be accidentally re-energized after you begin working on it. Follow your facility or OSHA Lockout/Tagout (LOTO) procedures ANYTIME maintenance or service is being performed on any electrical box or component. Affix a lock and warning tag on disconnects, breakers, and/or pulled fuses to alert others!



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

1. Use a voltage meter on circuits. DO NOT USE YOU FINGERS.
2. Use fuse pullers to change a fuse; NEVER use your bare hands, pliers, or screwdrivers.
3. Covers on exposed electrical devices or wires MUST be installed to protect personnel from serious injury.
4. ALL metal connection boxes, switch boxes, starting boxes, transformers, and motors must be grounded to prevent shock to personnel.
5. When using a portable electric meter, DO NOT attach one lead to the equipment and leave other lead dangling. Anyone touching it will receive a shock through the meter.
6. 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.
7. Avoid accidental contact with equipment or conductors which are known to be energized or are NOT known to be de-energized-energized. If it is necessary to work on equipment while it is energized, extra care must be used. Always test and repair equipment that indicates a warning of unsafe condition by giving a nonfatal shock. NEVER assume that because the warning shock is non-fatal, the next shock may be fatal.
8. **TAKE TIME TO BE CAREFUL!** Following safety precautions and using common sense will prevent injury, or death.

SAFETY PRECAUTIONS WHEN WORKING ON ENERGIZED CIRCUITS OR EQUIPMENT



Serious bodily injury or death could occur!

When electrical repair or maintenance work is required that prohibits de-energizing the circuits involved, an extreme measure of caution must be used. The work should be accomplished only by well trained and 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:

1. **The person performing the work should not be wearing:** wristwatch, watch chain, rings, necklaces, metal appendages to clothing, oversized metallic belt-buckles, or loose clothing which has the potential to make accidental contact with energized surfaces. In addition, long hair should be secured with a hairnet or covered with a plastic helmet.
2. Hair barrettes or bobble-pins are electrically conductive and accidental contact can cause serious bodily injury.
3. Clothing and shoes should be as dry as possible. No moisture should be present on the soles of shoes.
4. Insulate the worker from the ground by covering any adjacent grounded metal surfaces with an insulating material. Suitable insulating materials are dry wood, rubber mats, dry canvas, dry phenolic material, or even heavy, multi-ply paper (cardboard). Be sure that the insulating material has no holes present and there are no conductive materials (staples) embedded in it. Cover sufficient area so that adequate space is permitted for worker movement.
5. Any tool used when working on energized circuits must be insulated and rated to withstand to voltage of the energized circuits.
6. **DO NOT** use a bare screwdriver shaft or other tools with an energized fuse box.

FOR THE INSTALLATION ELECTRICIAN

1. Locate and review the electrical schematics furnished with the equipment.
2. Verify the proper fit-up, wiring and operation of all required electrical components.
3. Mount the push-button station out of reach from the carriage (approximately six feet).
4. Verify the proper fit-up, wiring and operation of all required electrical components.
5. Circuitry incorporates a current sensing magnetic overload relay. This device will reset at 70-80% of its overload condition. A timer is used to bypass the IOL relay for a nominal three seconds during starting in-rush.
6. With a standard lift the limit switches on the chain tensioning assembly should be wired (see your job specific electrical schematic as required) as follows:
7. If the tensioner chain goes slack causing the arm on the limit switch to move down or if a strong tension is exerted on the tensioner chain causing the arm to move up, there will be a break in the control power; therefore, with a standard lift they are wired to the normally closed contact on each limit switch. These limit switches are designated as 93LS and 94LS on the electrical drawing. On four-post units, there are two additional switches. They are designated as 95LS and 96LS.

Two-Level VRC Limit Switch Mounting Instructions

The standard two-level VRC incorporates one switch at each level to stop the carriage and one overtravel switch to act as a backup. The following instructions and diagrams show the most commonly used method of mounting these switches. Due to varying site conditions, the instructions and diagrams may not apply to an application due to possible site variances. If you need assistance, please contact Pflow Industries, Product Support Department, (414) 352-9000.

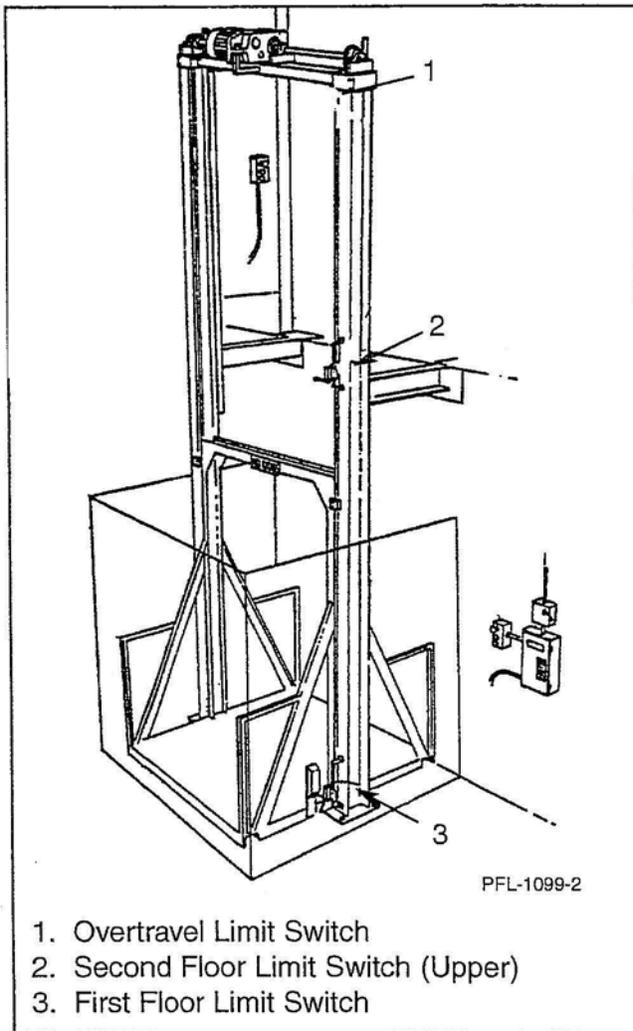


Figure 1

1. LOWER LEVEL - With the carriage resting on the lowest level, tack weld or clamp a limit switch assembly (L-bracket with limit switch mounted) to the column. The unistrut mounts should be positioned flush with the outside edge of the column. Do NOT weld to the column at this time. See Figure 2.

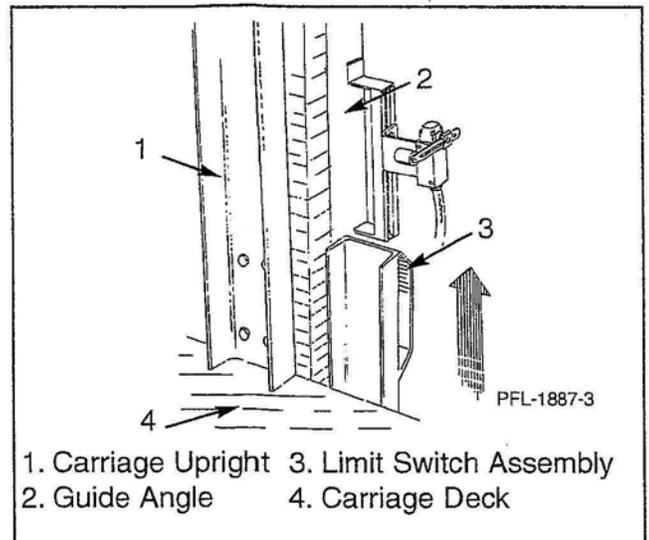


Figure 2

2. Position the limit switch actuator plate on the carriage so that the roller on the switch arm of the limit switch assembly makes contact with the center of the bottom of the actuator plate. See Figure 3.

Take a measurement from the carriage deck to the top of the limit switch actuator plate. This measurement will be needed for mounting the upper level limit switch. See Figure 3.

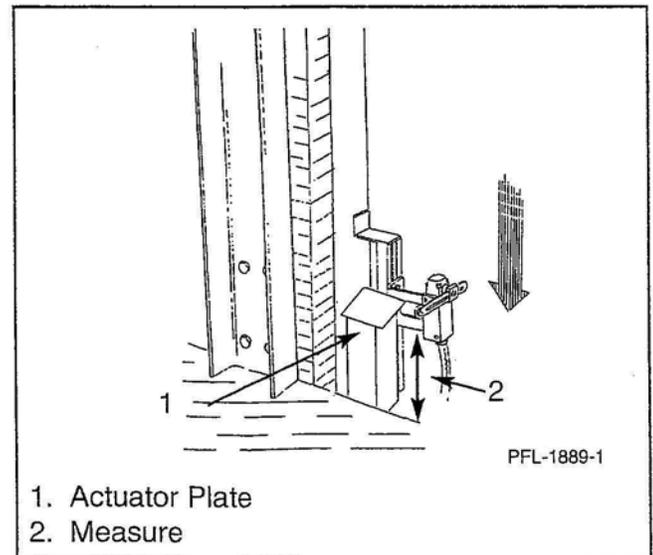


Figure 3

It is recommended that the overhang side of the plate be free to make contact with the limit switch arm. The arm is adjustable, and repositioning may be required to ensure the proper contact.

Two-Level VRC Limit Switch Mounting Instructions

3. UPPER LEVEL

Place a straightedge on the upper level and extend it to the column. See Figure 4.

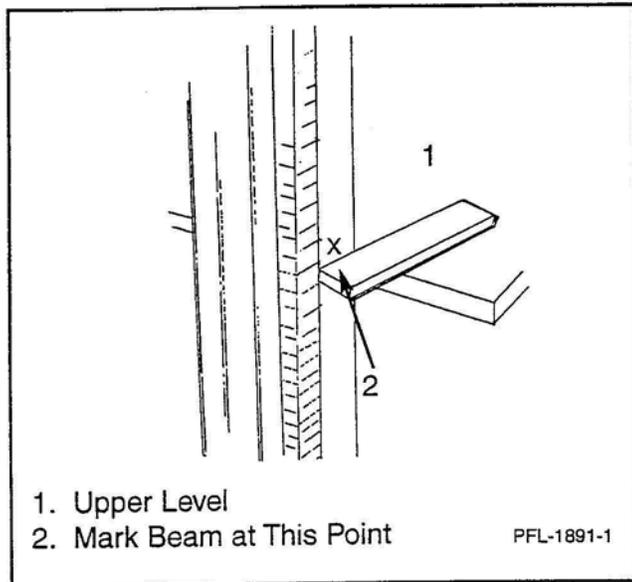


Figure 4

Placement of two to three feet of the straight edge on the floor should help to ensure a level reading. This mark shows where the carriage deck will be when the lift is stopped at that level.

4. Using the measurement taken in Step 2, measure up the same number of inches from the mark you placed on the column in Step 3. See Figure 5.

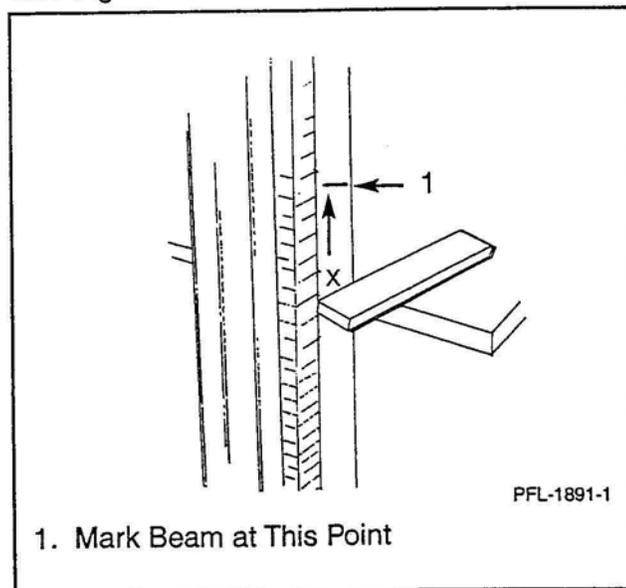


Figure 5

The upper level limit switch assembly will be centered on this point flush to the outside edge of the column and will operate in the upward direction off the top of the actuator plate. See Figure 6.

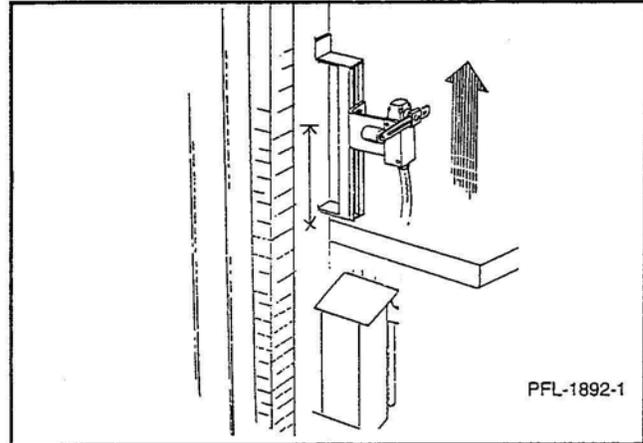


Figure 6

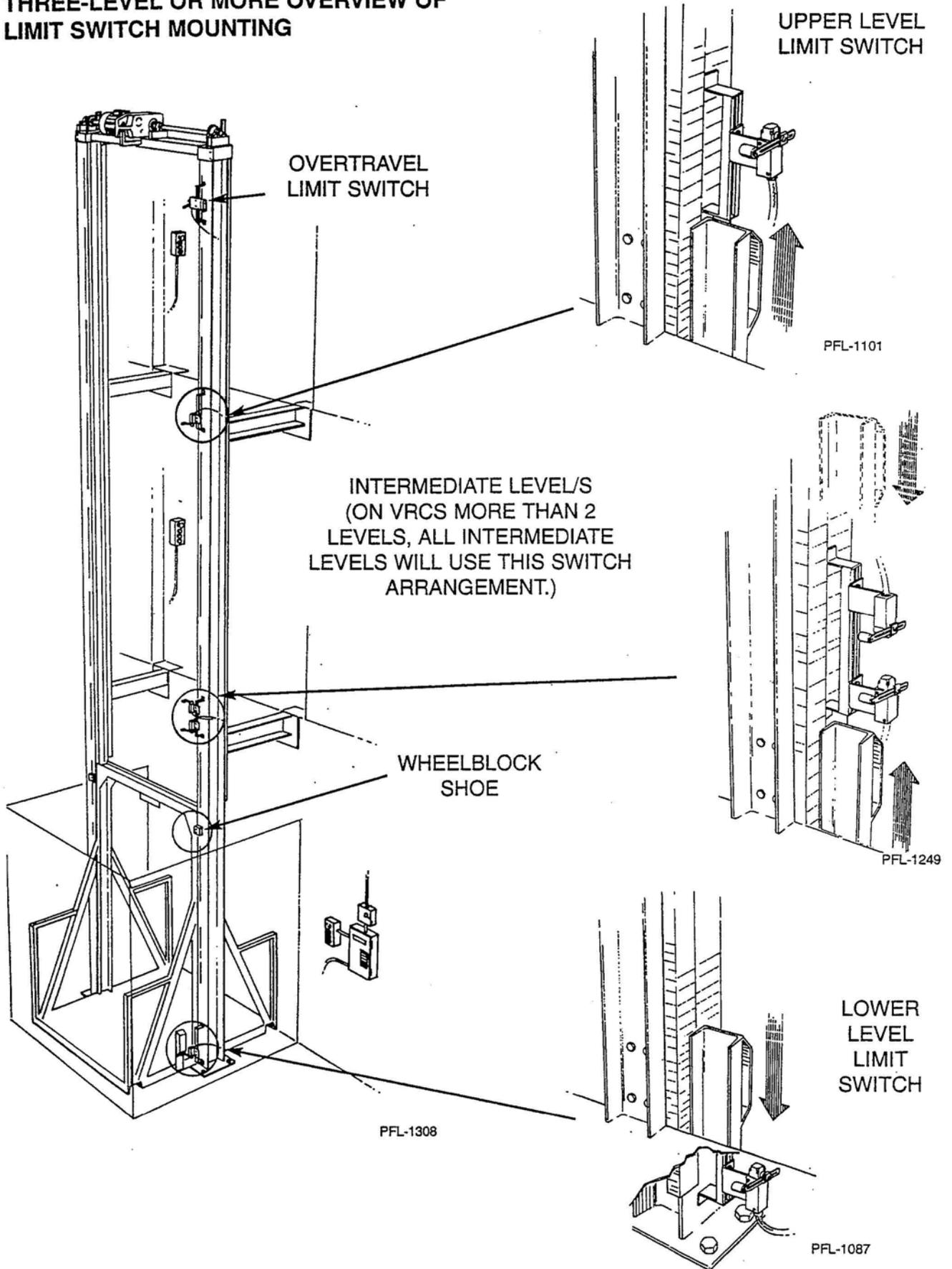
CAUTION
DO NOT WELD ON GUIDE ANGLE.

Weld the unistrut mounts to the face of the column. (This illustration is for alignment purposes only, and actual field application may vary.)

The overtravel limit switch can now be installed.

Three-Level or More Limit Switch Mounting Instructions

THREE-LEVEL OR MORE OVERVIEW OF LIMIT SWITCH MOUNTING

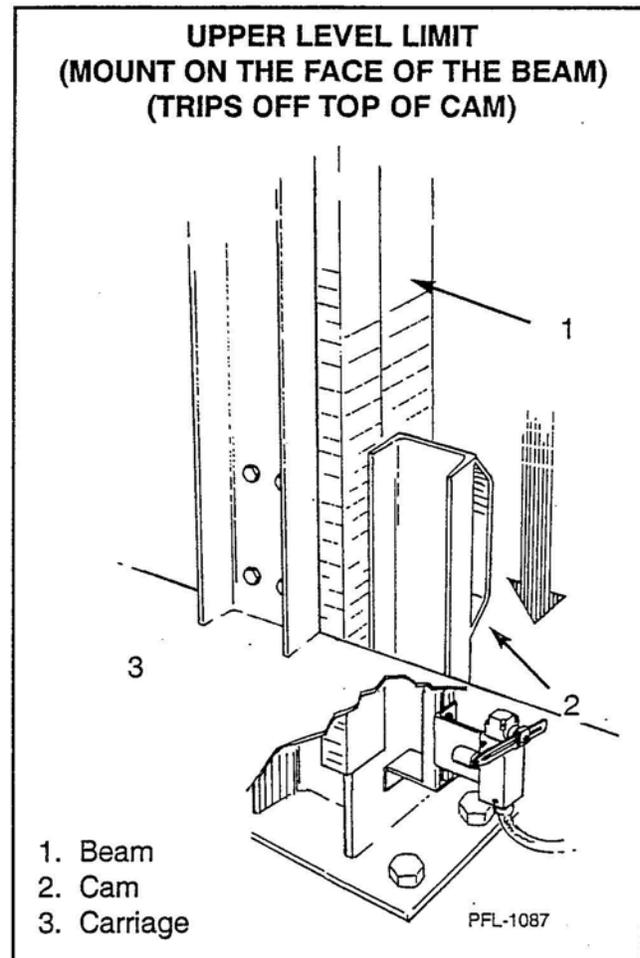
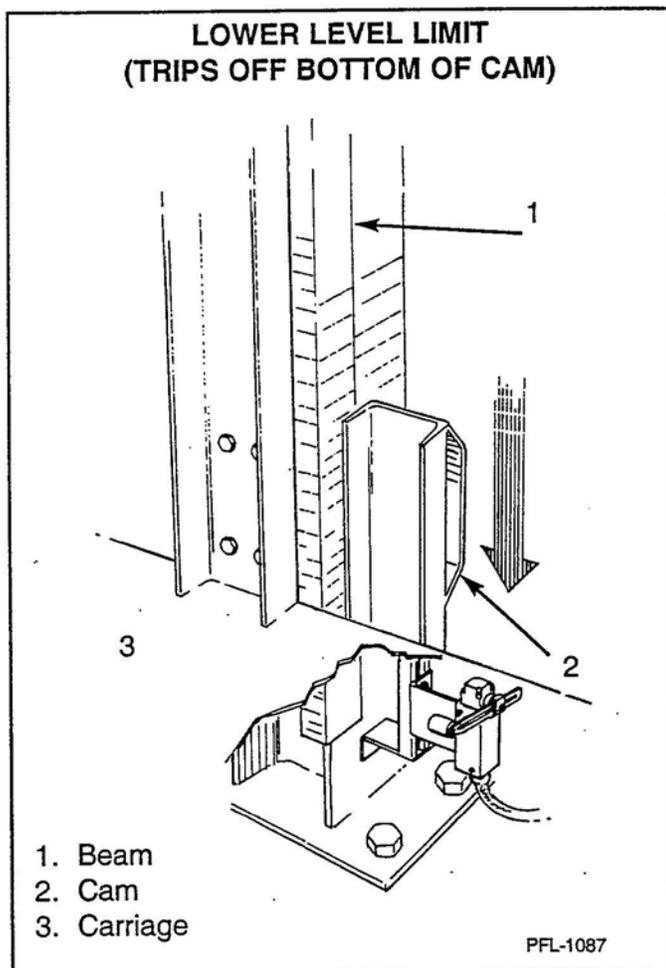


Three-Level or More Limit Switch Mounting Instructions

UPPER & LOWER FLOOR LIMIT SWITCHES (TOP LEVEL & LOWEST LEVEL) (EXAMPLE ON 3-LEVEL LIFT WOULD BE 1ST & 3RD)

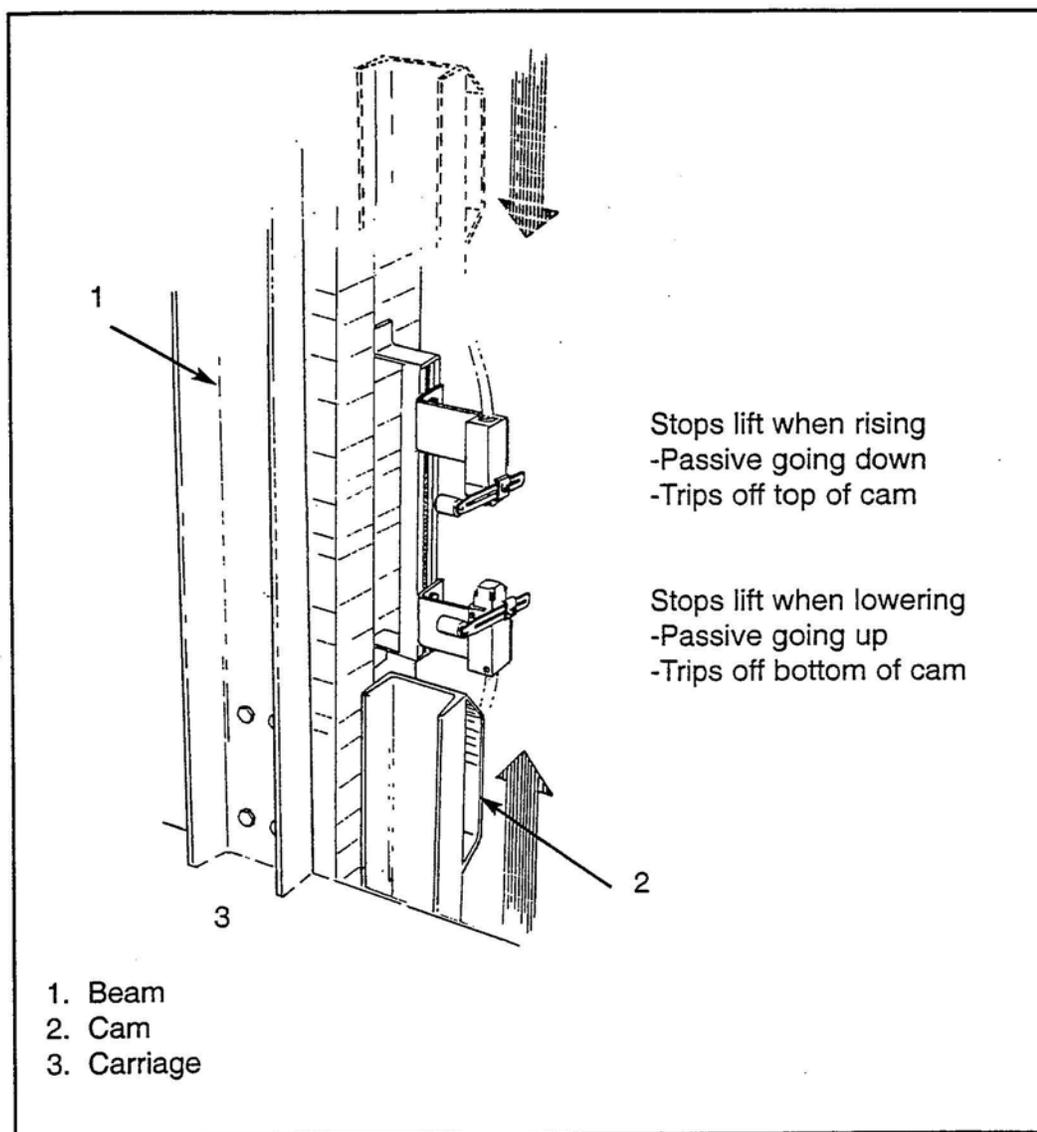
1. Hold a limit switch assembly on the beam. The assembly has only one limit switch on it. (Do not weld assembly to the beam at this time.) Tack weld or clamp. Place the actuator cam on the carriage so that the roller on the limit switch is on the center of the actuator cam. Then weld actuator cam solidly onto the carriage.
2. Install first floor level limit switch assembly as illustrated. NOTE: First floor limit switch is actuated off the bottom of the carriage cam, and the top floor level limit switch is actuated off the top portion of that same cam.

3. Install upper top floor level limit switch.



Intermediate Floor Level Limit Switch Mounting Instructions

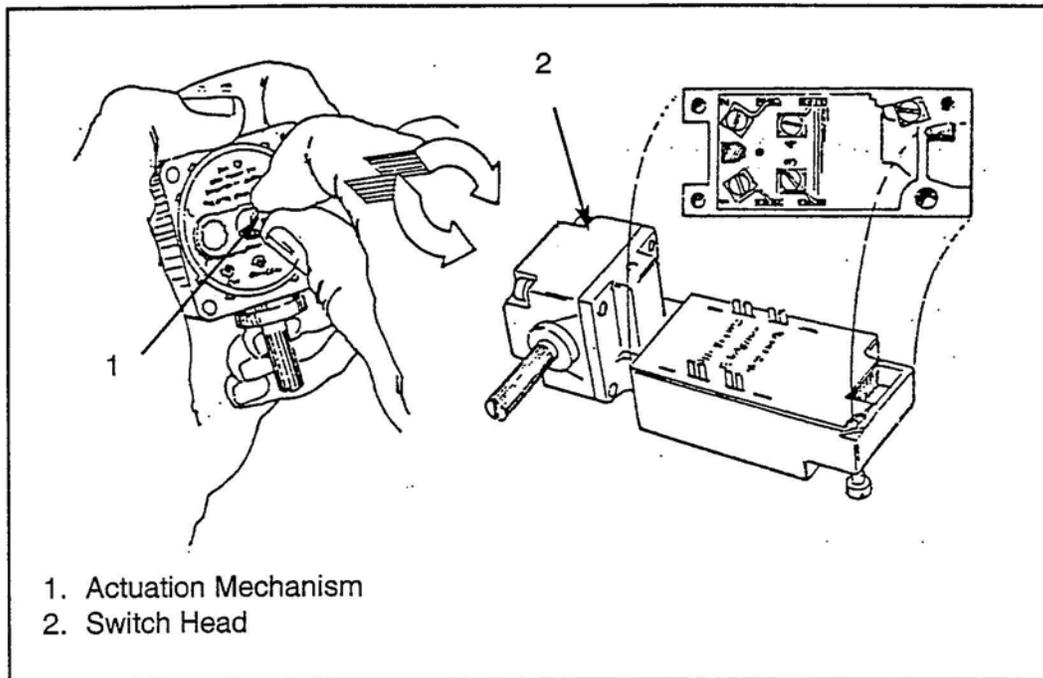
Install intermediate floor level limit switch assembly as illustrated. (It has two limit switches.)



Note: Limit switch actuation direction may have to be changed. Switches have to be passive in one direction. See Level Limit Switch illustration (B189-4) to change actuation direction, if necessary.

Level Limit Switch - Changing Actuation

On units with intermediate floors, it may be necessary to change switch actuation direction. Use B189-3 as a guide.



1. To change actuation direction, remove switch head.
2. Change actuating control mechanism to desired actuation direction. CW, clockwise, switch will activate in clockwise direction. CW - CCW switch will activate in both directions (used in this position for upper and lower switches); and CCW, counterclockwise, switch will activate when turned counterclockwise. The switch has four settings that can be changed by pulling actuation mechanism inside the switch head, rotating actuation mechanism, and allowing activator to reset.
3. You can tell switch actuation direction by turning it. There should be a "click" when switch activates.

Overtravel Limit Switch Mounting Instructions

Measure the distance from the top of the carriage deck to the top of the wheelblock shoe. Take this distance and measure from the upper floor level mark you made on the column in Step 3, Bulletin 187, and again mark the column.

At this point, weld the overtravel limit switch bracket so the unistrut is centered on this mark and the limit switch roller will contact the wheelblock shoe.

NOTE

For overtravel, the limit switch L-bracket has to be loosened from the unistrut and mounted in the position shown in Figure 1.

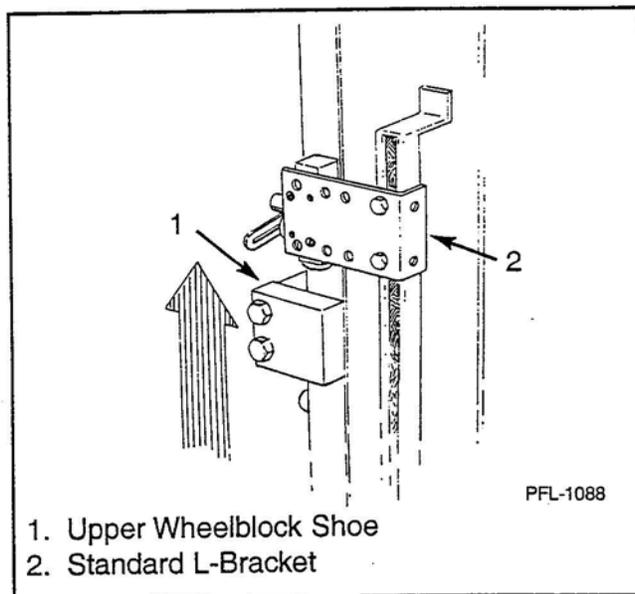


Figure 1

CANTILEVER APPLICATIONS

Figures 2, 3, and 4 represent possible mounting options of the overtravel switch.

Cantilevered applications are usually required due to lack of space available. We, therefore, recommend mounting the switch assemblies inside of the column as shown with the above overtravel arrangement.

Where enclosures are mounted on the back of the carriage, you may want to use the carriage as an alternate actuator plate.

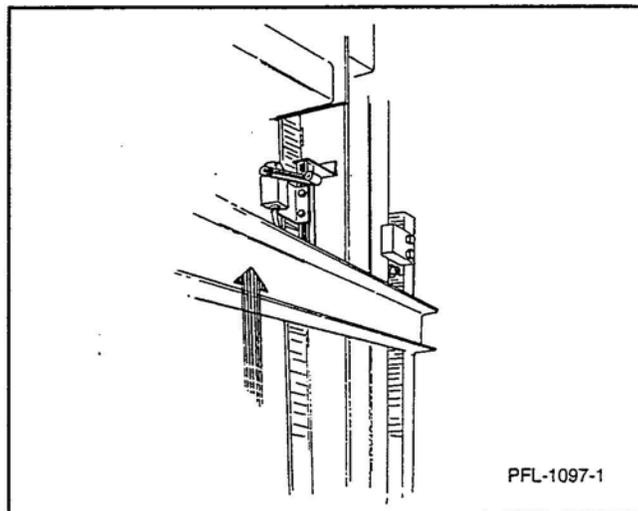


Figure 2

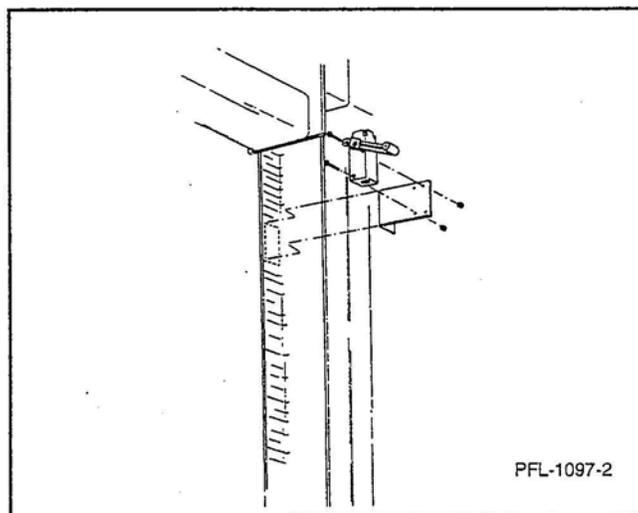


Figure 3

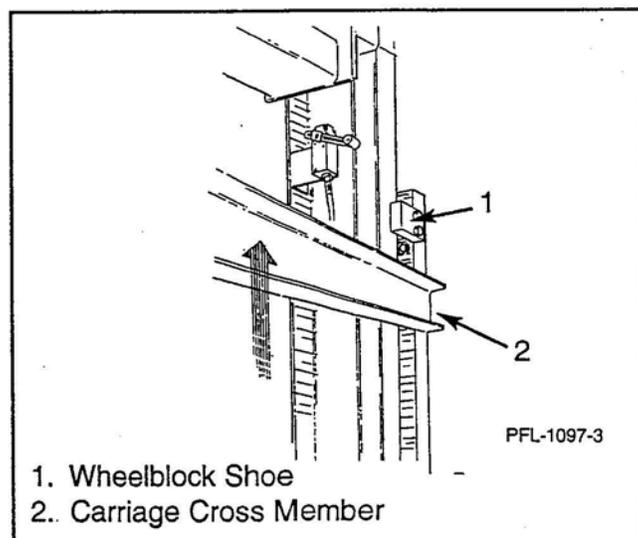


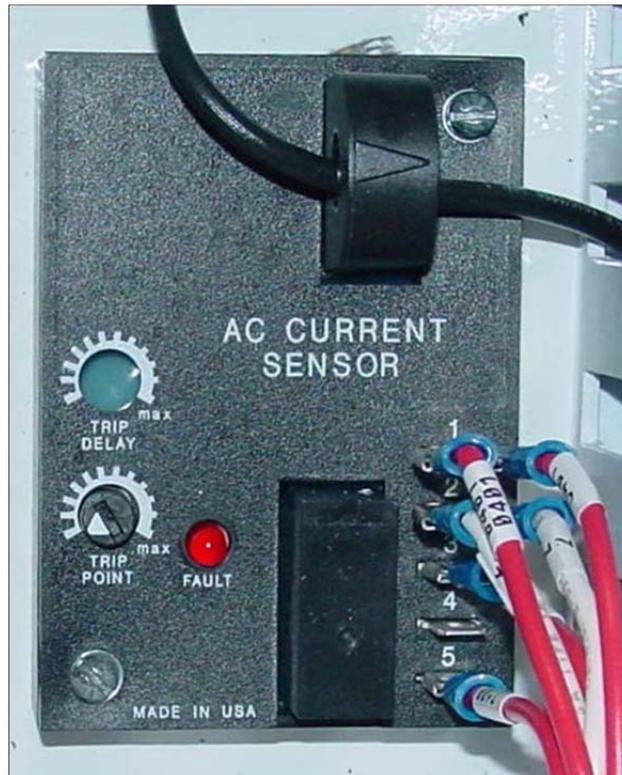
Figure 4

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SETTING THE OCS (OVERCURRENT SENSOR)

INFIELD ADJUST-STEPS

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 OCS trips, turn the current adjustment dial clockwise a small amount and repeat step 3.
5. If the OCS does not trip, run the carriage DOWN.
6. If the OCS trips, turn the current adjustment dial clockwise a small amount and repeat step 5.
7. If the OCS does not trip, run the carriage UP and DOWN several times.
8. If the OCS trips, repeat step 3.
9. If the OCS does not trip, the solid state IOL is properly adjusted.



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

OCS (OVERCURRENT SENSOR) - Field Adjustment

Notes

SEW EURODRIVE BRAKE OPERATION - RESOURCE



15870-0003

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

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

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

MAINTENANCE

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

WARNING



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

WARNING

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

NOTICE

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

ALL INSTRUCTIONS THAT INVOLVE ELECTRICAL WORK APPLY TO THE ELECTRICIAN!

BMG BRAKE SYSTEM OPERATION

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

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

DR MOTOR BRAKE SR RELAY CONNECTION DIAGRAMS

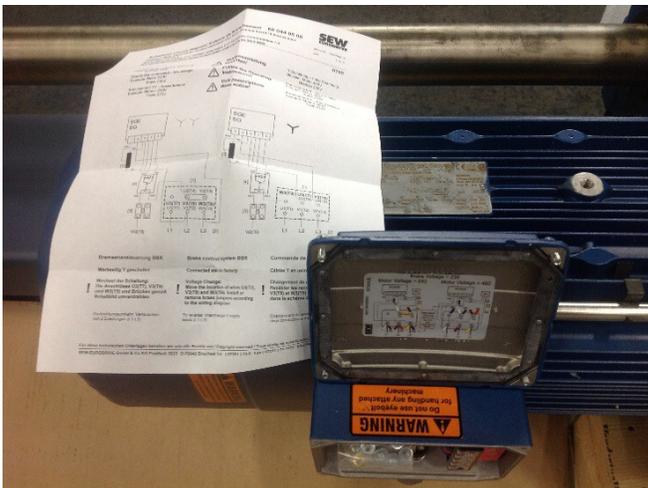


Figure 1

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

See Figure 1

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

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

SEW-EURODRIVE, INC. USA

SO# **850018425.02.001** → 850

L 660 S 15460
 D.G 110.40 1.1
 B3A
 20011GEAR 636 0 3+4C

Enter Print

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

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



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

15870-0005

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

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



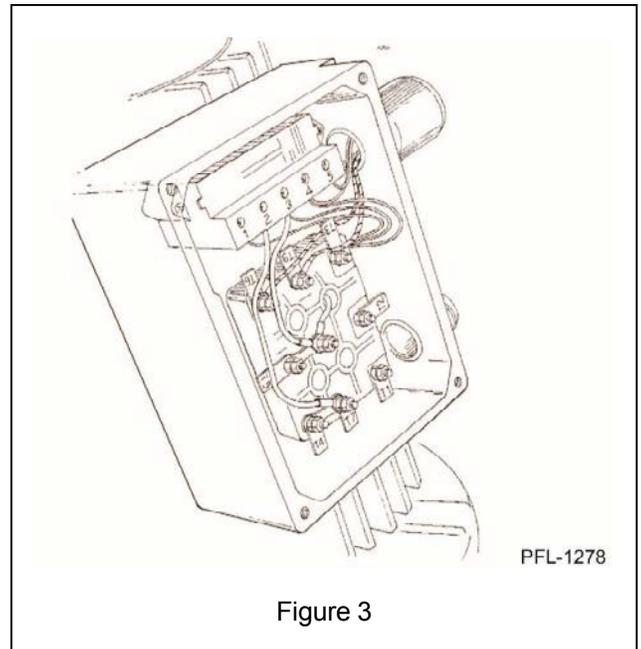
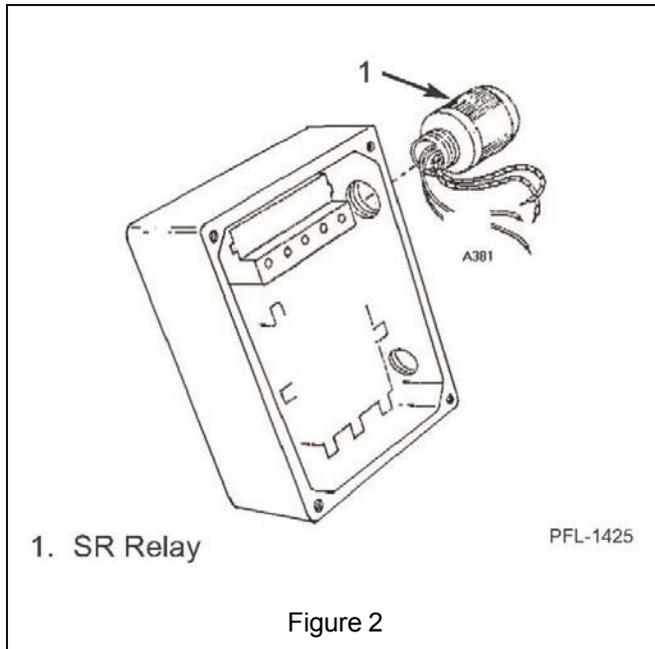
15870-0001

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

SR RELAY WIRING (WHEN USED)

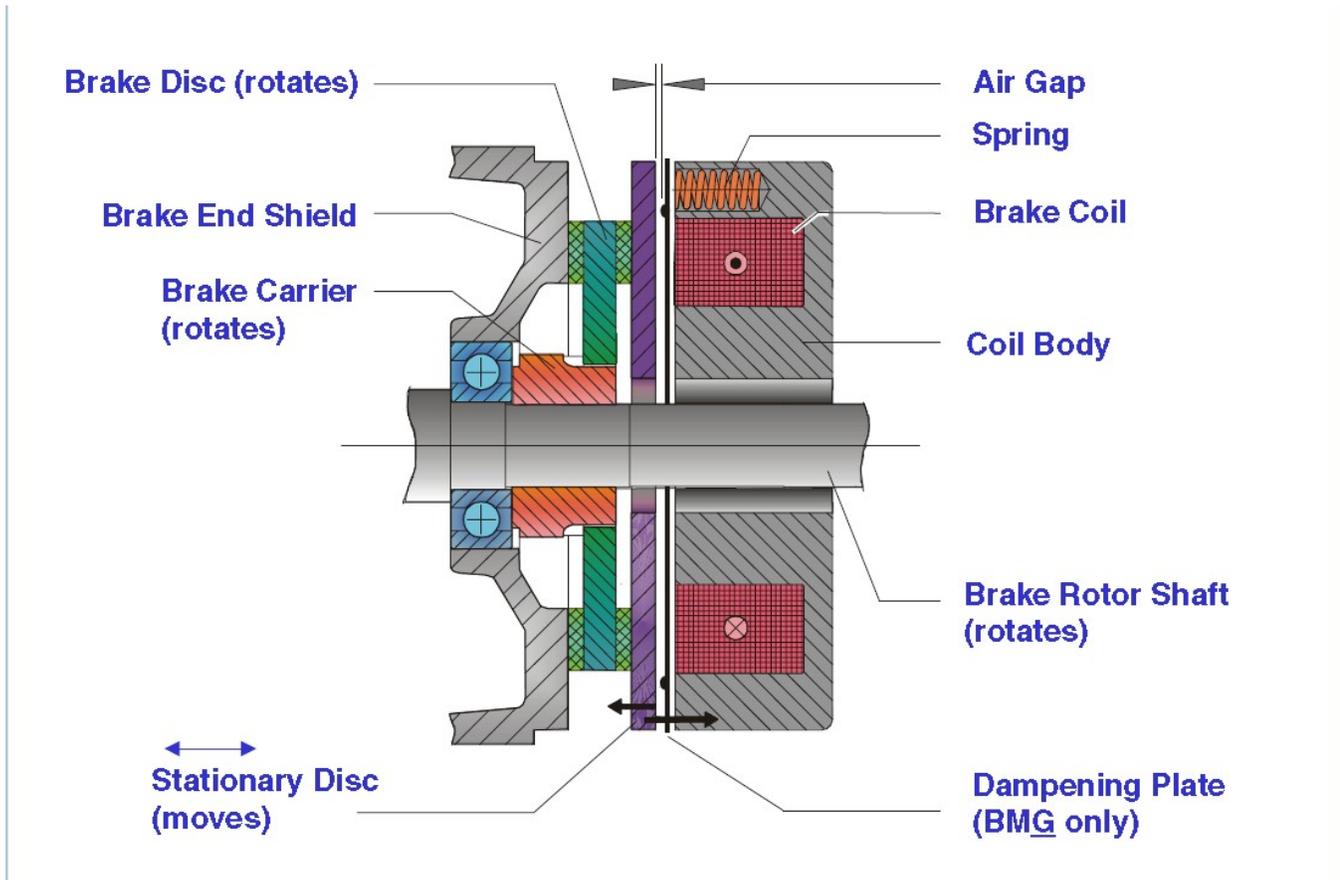
BSR control: combination of the BG or BGE rectifier and the SR relay. Used for fast brake action without additional customer supplied wiring or contacts.



TROUBLESHOOTING

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

BRAKE COMPONENTS



NOTICE

For SEW Eurodrive brake only!

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



15870-0006

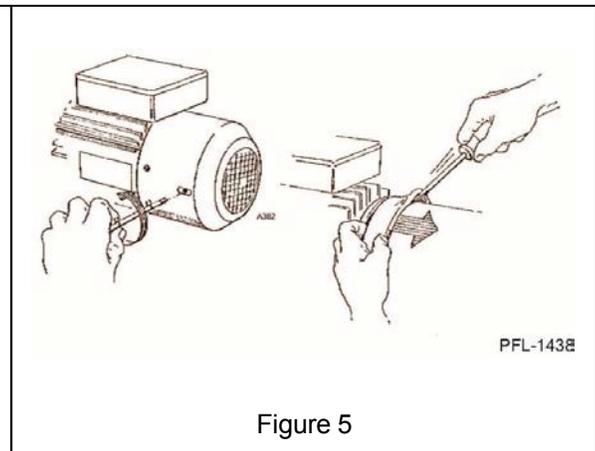
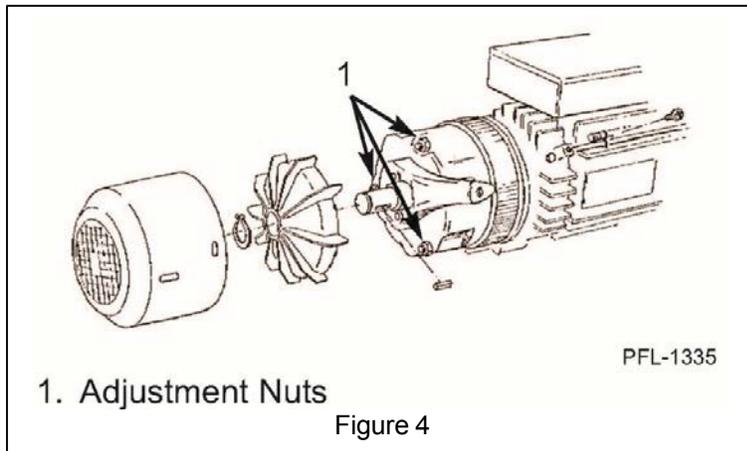
http://www.seweurodrive.com/s_admin/inc.training/files/Brake_Service_and_Maintenance.pdf

ADJUSTING BRAKE AIR GAP

NOTICE

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

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



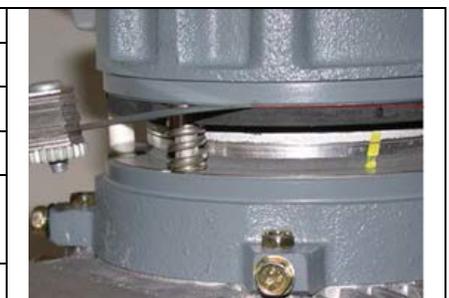
⚠ CAUTION

Do not over tighten nuts!

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

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

Table 1

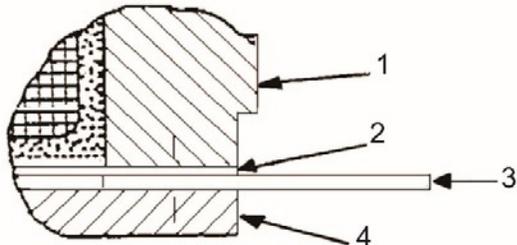


NOTICE

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

NOTICE

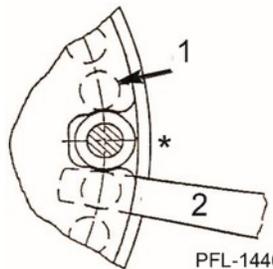
There must always be clearance on the release arm lever.
The brake release mechanism is not used to change the brake's torque setting.



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

PFL-1445

Figure 6



- 1. Damping Plate Button
- 2. Feeler Gauge

NOTE

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

PFL-1440

Figure 7

BRAKE DISC INSPECTION

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

HAND RELEASE MECHANISM

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

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

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

NOTICE

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

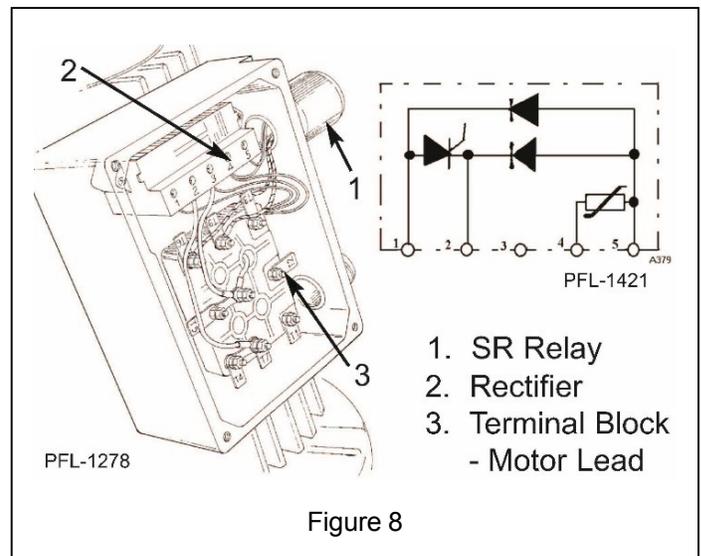
TESTING BRAKE RECTIFIER

WARNING

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

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

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



CAUTION

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

Notes

INSTALLATION COMPLETION CHECKLIST

Please make sure all of the following steps are completed.

✓		Verify Completion Check
	1	The VRC is braced from front to back and from side to side.
	2	The gates and enclosures are braced.
	3	Touch up all welds marks, scrapes, etc. with paint.
	4	Route hoses to prevent interference during travel (If applicable).
	5	Check fittings and hoses for leakage (If applicable)
	6	Make sure all electrical connections are properly made.
	7	Check that the carriage stops level at each floor.
	8	Is there excessive noise during travel?
	9	Does carriage "rock" during travel?
	10	Full load test completed

✓		Verify Completion Check
	11	The <u>gate should open</u> when the <u>unit is present</u> at each level.
	12	The unit should <u>not operate with any gate open</u> .
	13	Check each level for items 1 and 2 above.
	14	Are there any unsafe conditions? If so, please contact PFlow Industries, Inc. Product Support Dept. immediately and report them.
	15	Post all required operational signs.
	16	Clean the installation site & remove all debris.
	17	Instruct the customer on proper lift operation.
	18	Instruct customer on procedures if there is a problem.
	19	Complete the Installation Questionnaire and Acceptance Certificate. Return both to PFlow Industries, Inc.



15870-0001

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

Installation Completion Checklist – Section 12



Notes

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

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

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Notes

Notes

PARTS AND LABOR

Parts:

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

Labor:

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

WARRANTY

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

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

PRE-AUTHORIZATION

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

INVOICES

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

COMMENTS

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

Notes

Options

Options

BI-PARTING SWING GATE INSTALLATION INSTRUCTIONS

IDENTIFY COMPONENTS

Gate components, posts, panels, header assembly, interlocks, will have color coded tags. Each gate tag will be a different color:

Level	Tag Color
1 st (Bottom)	Green
2 nd	Yellow
3 rd	Red
4 th	Blue
5 th	Orange
6 th and higher	White

INSTALLATION

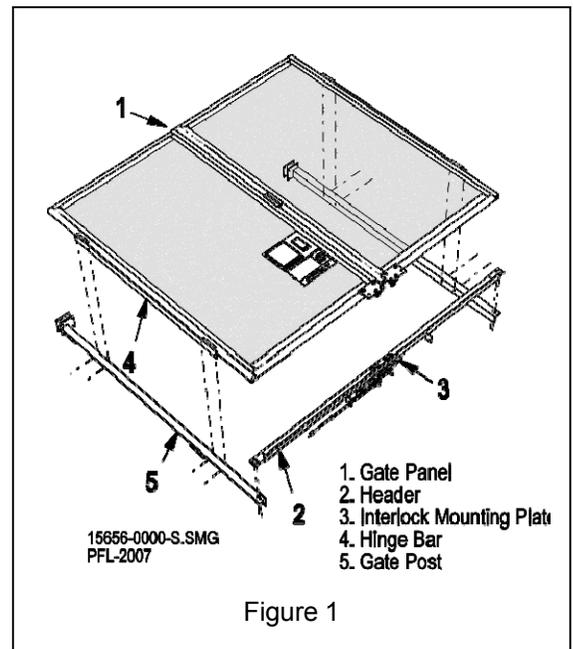

DANGER

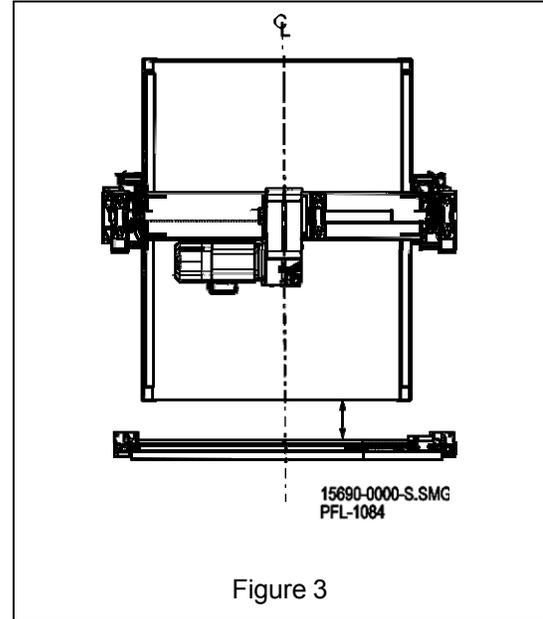
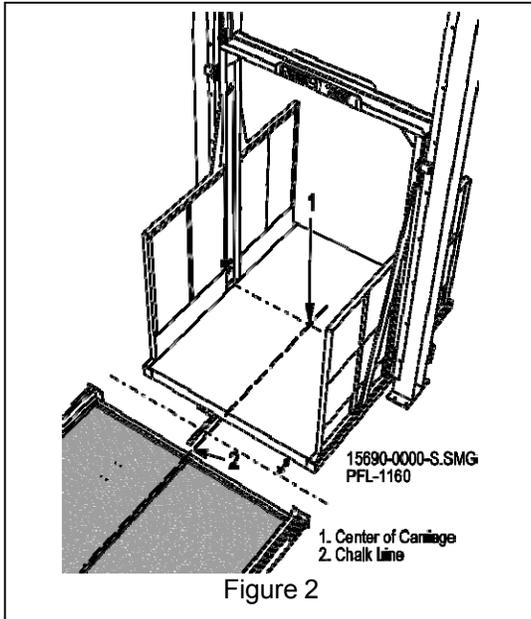
During the gate installation the gate panel safety latch may not be operational. At gate locations take all necessary site precautions to protect site personnel from falls.

Never leave a gate or gate panel unattended without proper protection and warning for site personnel.

The preferred method of installing a bi-parting swing-type gate is to pre-assemble the gate on the floor and then stand it up. The following instructions are for pre-assembly of the gates. If for some reason pre-assembly is not possible, use these instructions as a general guide for the assembly, positioning, and securing the gates.

1. Lay the gate posts on the floor parallel to each other. **See Figure 1.**
2. Place the angle iron "header" at the top of the gate posts and bolt in position with hardware provided.
3. Place the gate panels in position between the gate posts and hinge bars.
4. Locate and mark the center of the gate panel (where panels meet in the center.)
5. Locate and mark center of the carriage. Using a carpenter square held on the front edge of the carriage, mark a chalk line on the floor to assure the center of the gate is on the center line of the carriage. **See Figure 2.**





- The ideal position of the gate is 6" from inside of gate panels to carriage. However, the gate can be located anywhere within a range of 4" minimum from inside of gate panel to carriage and a maximum of 6" from inside of gate panels to carriage. Individual state code requirements may apply. **See Figure 3.**
- When the gate panel to carriage measurement has been determined, snap a chalk line to identify gate position parallel to the carriage.

NOTICE

The length of enclosure panels may be the determining factor in gate location.

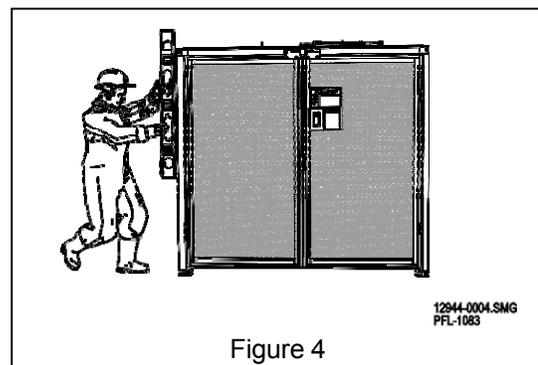
- Raise the gate assembly. Position the gate assembly so the center of the gate is located on the center of the carriage line and the inside of gate panel is on the chalk line parallel to the carriage.

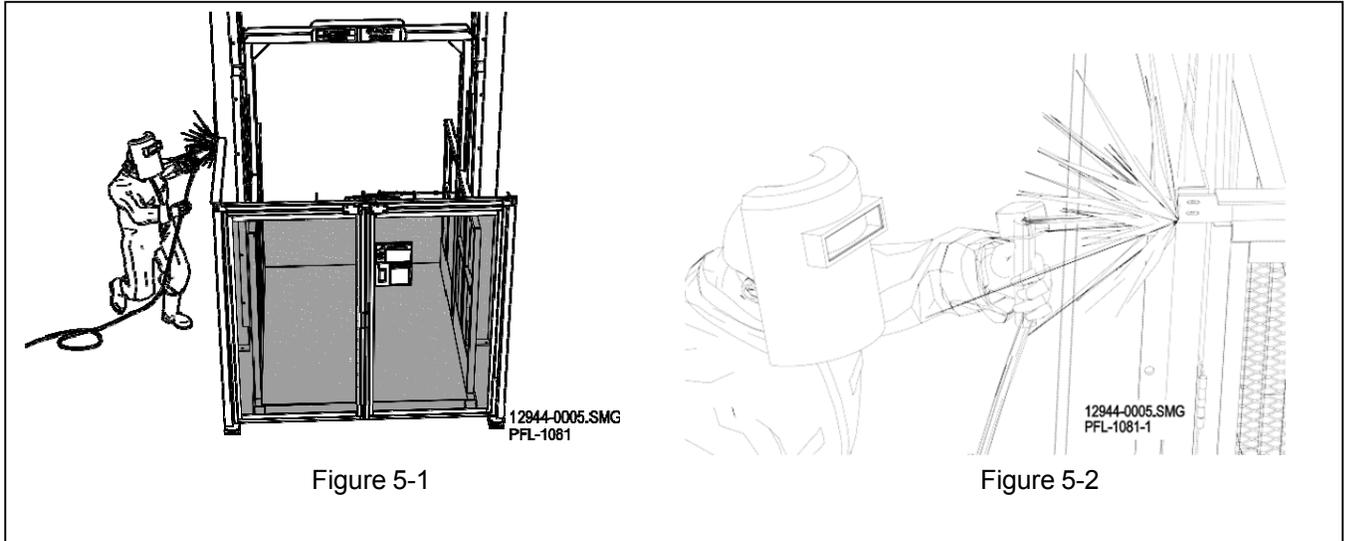
NOTICE

Anchor hole should always be deeper than the length of the anchor bolt.

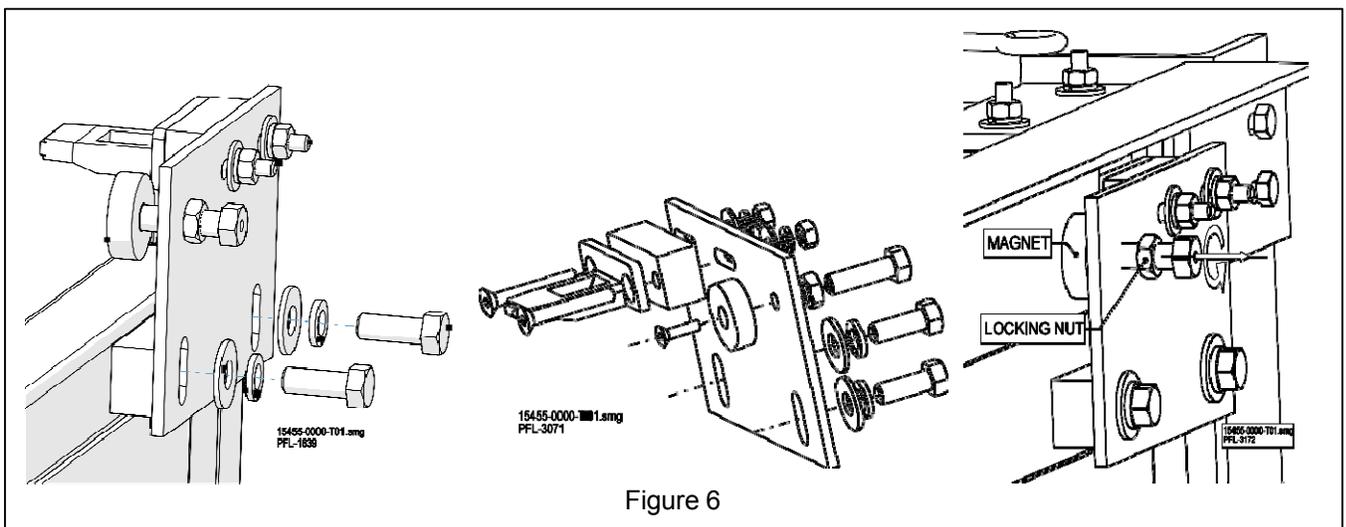
Recommended wedge anchor size: 3/8" dia. x 3 1/2 long.

- Using 3/8" anchors 3 1/2" long, drill and anchor gate post base plates to the floor.
- Plumb the gate using a plumb bob or a four foot or longer level. **See Figure 4.**
- With the gate posts plumb, measure from gate post to VRC column. Cut two support braces and install as illustrated (1 1/2" x 1 1/2" x 1/4" steel angle or similar). **See Figure 5-1.**





12. Tighten all gate panel and header bolts.
13. Verify gate panel swing for proper operation and site operational clearance.
14. Weld steel angle header to gate posts. **See Figure 5-2.**
15. Install the gate interlock.
16. Install the interlock keeper assembly. Field align the interlock keeper latch to properly engage the internal interlock contacts and latch. Each panel requires an interlock keeper assembly.
17. With the lift carriage present at the gate check that the interlock keeper assembly magnet holds the panel closed until the operator pulls open the panel. The magnet will require field adjustment to fine tune the panel "held closed" force. Adjust the panel position by backing off the magnet locking nut. Rotate the magnet hex head bolt to position the panel. Secure the magnet position by turning down and locking the magnet locking nut. **See Figure 6.**
18. Verify gate interlock operation with the lift carriage present and with the lift carriage not present.



Bi-Parting Swing Gate Installation Instructions

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



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SWING GATE INSTALLATION INSTRUCTIONS

IDENTIFY COMPONENTS

Gate components, posts, panels, header assembly, interlocks, will have color coded tags. Each gate tag will be a different color.

Level	Tag Color
1 st (Bottom)	Green
2 nd	Yellow
3 rd	Red
4 th	Blue
5 th	Orange
6 th and higher	White

INSTALLATION

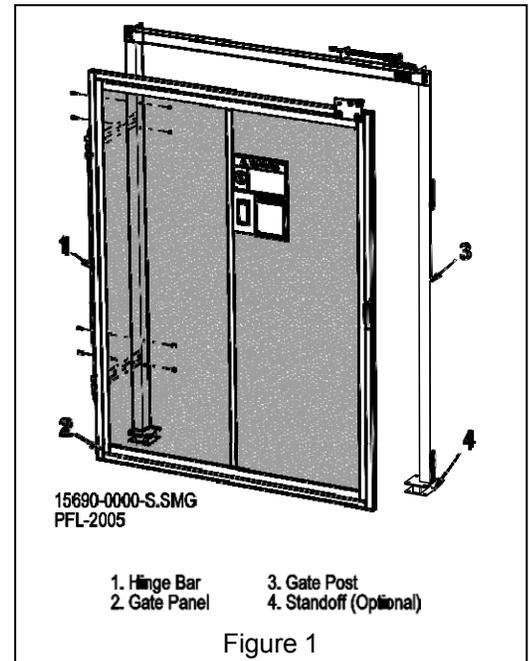
 **DANGER**

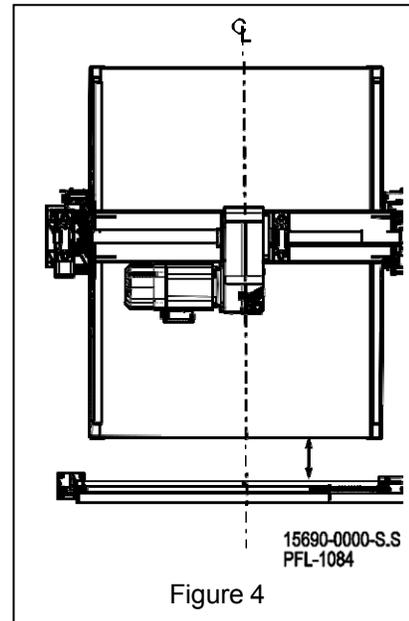
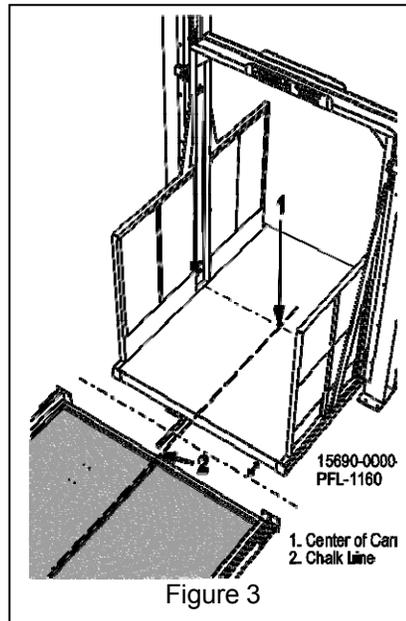
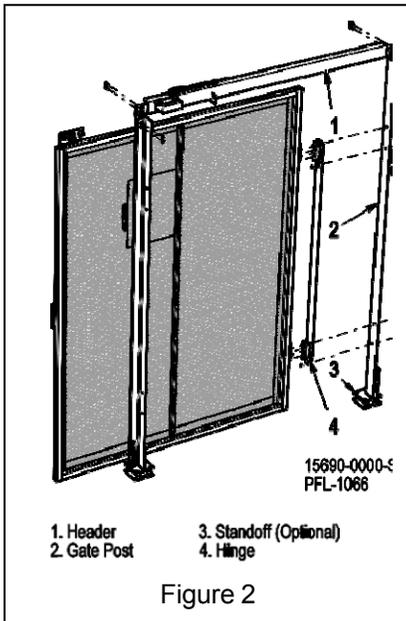
During the gate installation the gate panel safety latch may not be operational. At gate locations take all necessary site precautions to protect site personnel from falls.

Never leave a gate or gate panel unattended without proper protection and warning for site personnel.

The preferred method of installing a swing gate is to pre-assemble the gate on the floor and then stand it up. The following instructions are for pre-assembly of the gates. If for some reason pre-assembly is not possible, use these instructions as a general guide for the assembly, positioning, and securing the gates.

1. Lay the gate posts on the floor parallel to each other. **See Figure 1.**
2. Place the steel angle “header” at the top of the gate posts and bolt in position with hardware provided. **See Figure 2.**
3. Place the gate panels in position between the gate posts and hinge bars. **See Figure 2.**
4. Locate and mark the center of the gate panel (where panels meet in the center.)
5. Locate and mark center of the carriage. Using a carpenter square held on the front edge of the carriage, mark a chalk line on the floor to assure the center of the gate is on the center line of the carriage. **See Figure 3.**





6. The ideal position of the gate is 6" from inside of gate panels to carriage. However, the gate can be located anywhere within a range of 4" minimum from inside of gate panel to carriage and a maximum of 6" from inside of gate panels to carriage. **See Figure 4.**
7. When the gate panel to carriage measurement has been determined, snap a chalk line to identify gate position parallel to the carriage.

NOTICE

The length of enclosure panels may be the determining factor in gate location.

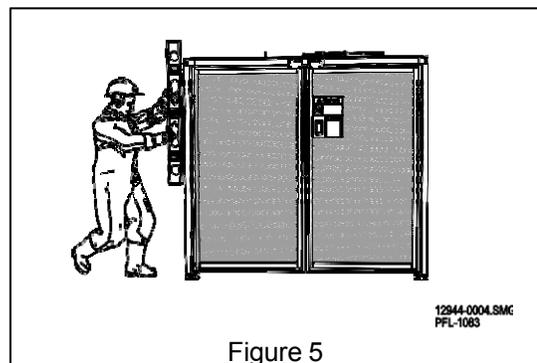
8. Raise the gate assembly. Position the gate assembly so the center of the gate is located on the center of the carriage line and the inside of gate panel is on the chalk line parallel to the carriage.

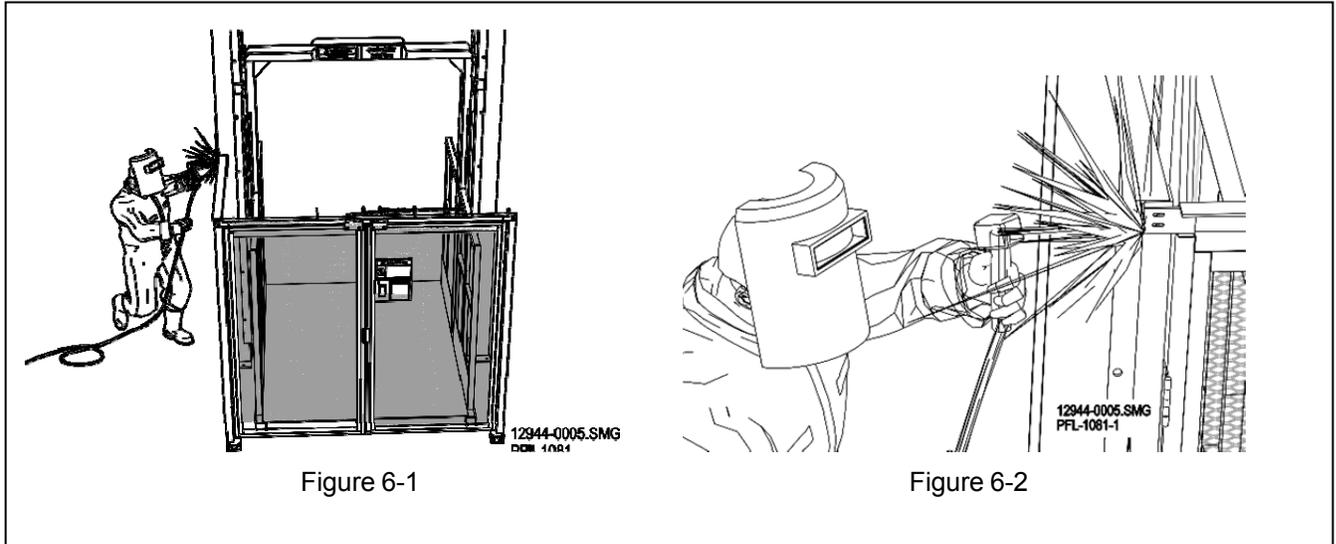
NOTICE

Anchor hole should always be deeper than the length of the anchor bolt.

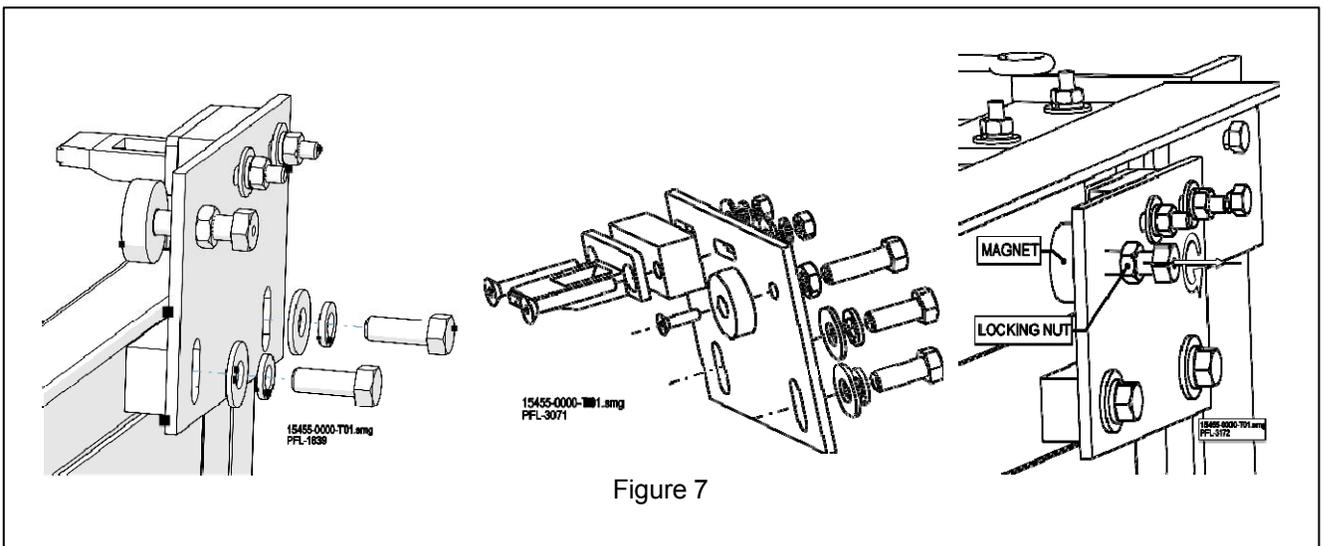
Recommended wedge anchor size: 3/8" dia. x 3 1/2 long.

9. Using 3/8" anchors 3 1/2" long, drill and anchor gate post base plates to the floor.
10. Plumb the gate using a plumb bob or a four foot or longer level. **See Figure 5.**
11. With the gate posts plumb, measure from gate post to VRC column. Cut two support braces and install as illustrated (1 1/2" x 1 1/2" x 1/4" steel angle or similar). **See Figure 6-1**





12. Tighten all gate panel and header bolts.
13. Verify gate panel swing for proper operation and site operational clearance.
14. Weld steel angle header to gate posts. **See Figure 6-2.**
15. Install the gate interlock.
16. Install the interlock keeper assembly. Field align the interlock keeper latch to properly engage the internal interlock contacts and latch. Each panel requires an interlock keeper assembly.
17. With the lift carriage present at the gate check that the interlock keeper assembly magnet holds the panel closed until the operator pulls open the panel. The magnet will require field adjustment to fine tune the panel "held closed" force. Adjust the panel position by backing off the magnet locking nut. Rotate the magnet hex head bolt to position the panel. Secure the magnet position by turning down and locking the magnet locking nut. **See Figure 7.**
18. Verify gate interlock operation with the lift carriage present and with the lift carriage not present.



Swing Gate Installation Instructions

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



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SLIDING GATE INSTALLATION INSTRUCTIONS

IDENTIFY COMPONENTS

Gate components, posts, panels, header assembly, interlocks, will have color coded tags. Each gate tag will be a different color.

Level	Tag Color
1 st (Bottom)	Green
2 nd	Yellow
3 rd	Red
4 th	Blue
5 th	Orange
6 th and higher	White

INSTALLATION

The preferred method of installing a sliding gate is to pre-assemble the gate on the floor and then stand it up. The following instructions are for pre-assembly of the gates. If for some reason pre-assembly is not possible, use these instructions as a general guide for the assembly, positioning, and securing of the gates.

1. Lay the gate posts on the floor parallel to each other with the gate post that has the hole or cutout for the interlock on the closing end. The middle post should have two holes near the base plate for mounting the guide block. **See Figure 1.**
2. Bolt the trolley track header to the gate posts, and slide the gate panel into the trolley track header.
3. Bolt guide block to middle post. **See Figure 2.**

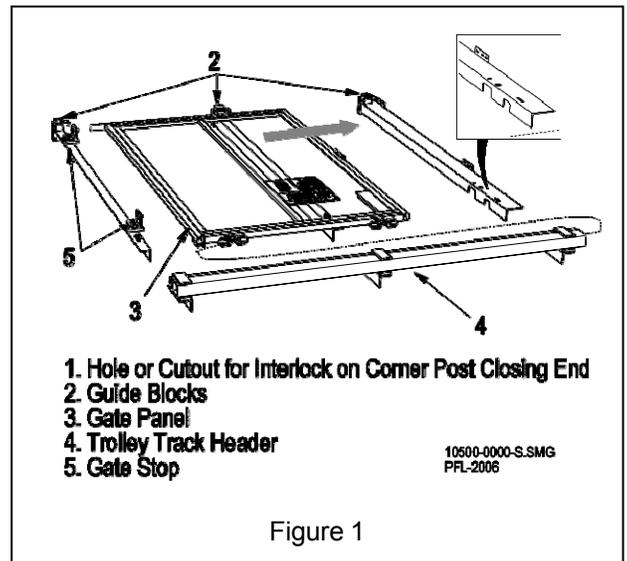


Figure 1

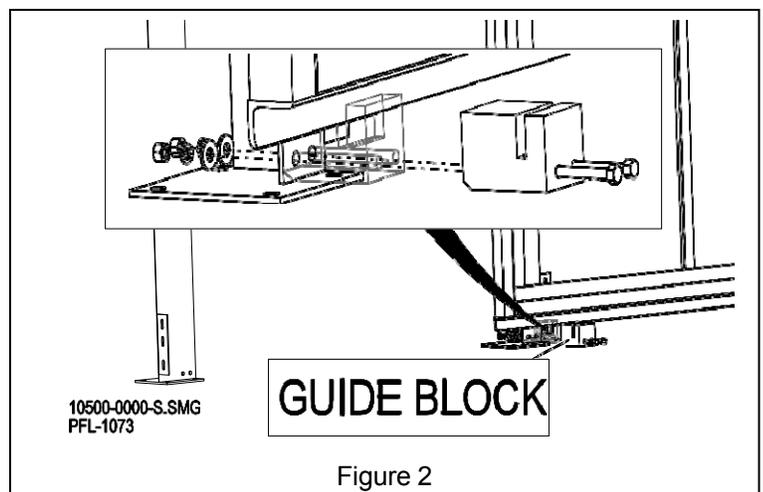
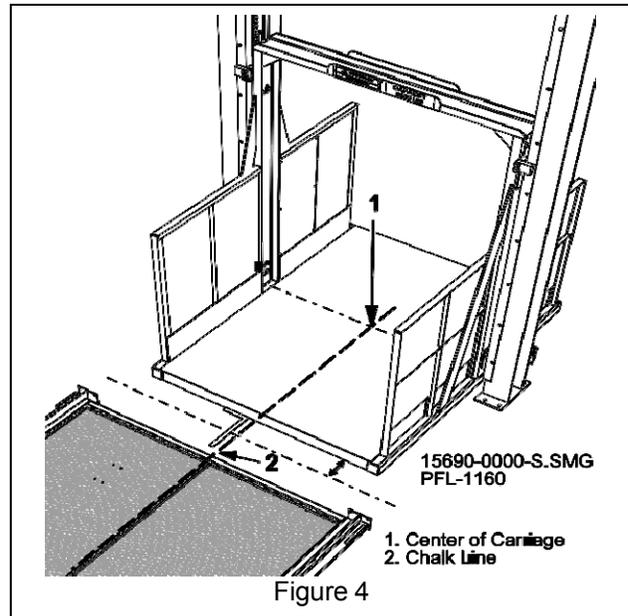
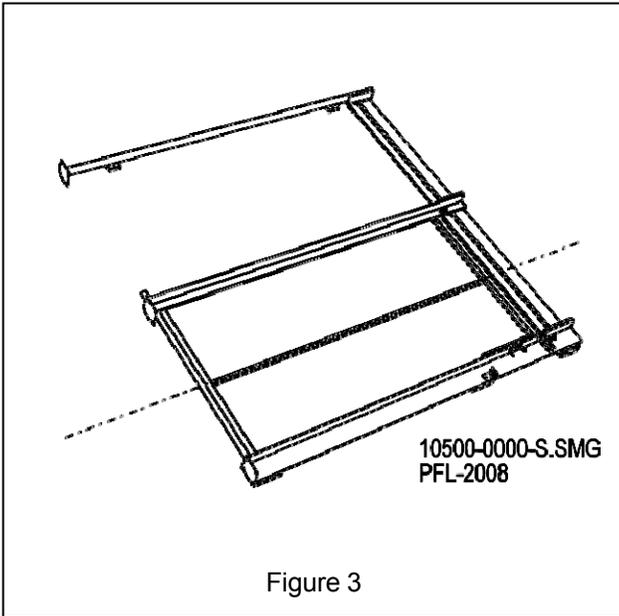
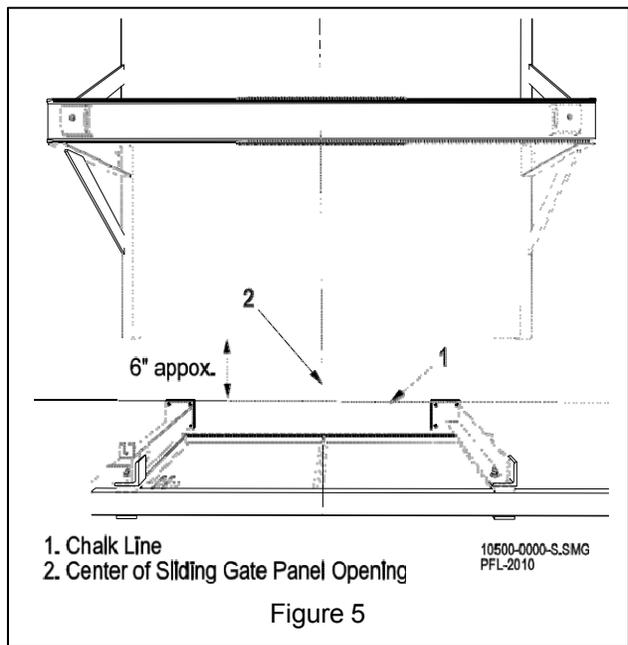


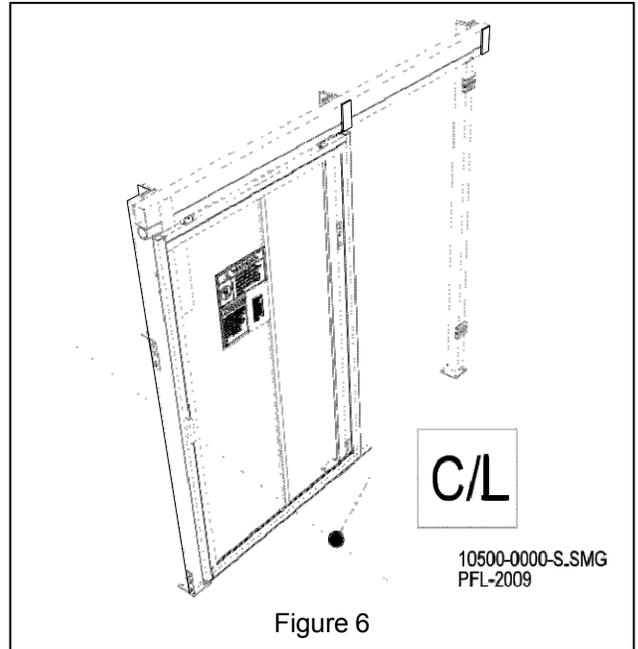
Figure 2



4. Slide gate to its closed position. Add remaining guide blocks. Locate and mark center of the gate panel. **See Figure 3.**
5. Locate and mark center of carriage. Using a carpenter square held on the front edge of the carriage, mark a chalk line on the floor to ensure center of the gate is on the center line of the carriage. **See Figure 4.**
6. The ideal position of the gate is 6" from inside of gate to carriage. However, the gate can be located anywhere within a range of 4" minimum from the inside of the gate post to carriage and a maximum of 6" from inside of gate post to carriage. Verify if the local code requires a panel distance from carriage. When the gate post to carriage measurement has been determined, snap a chalk line to identify the gate position parallel to the carriage. **See Figure 5.**



7. Raise the gate assembly. The track and gate are to be on the outside. Position the gate assembly so the center of the closed gate is located on the center of the carriage parallel to the carriage and the inside of the gate posts' base plates are on the chalk line. **See Figure 6.**
8. Using 3/8" anchors 3 1/2" long, drill and anchor gate post gate plates to the floor.



NOTICE

Length of enclosures may be a determining factor in gate location. Check GA drawing for enclosure placement.

Sliding Gate Installation Instructions

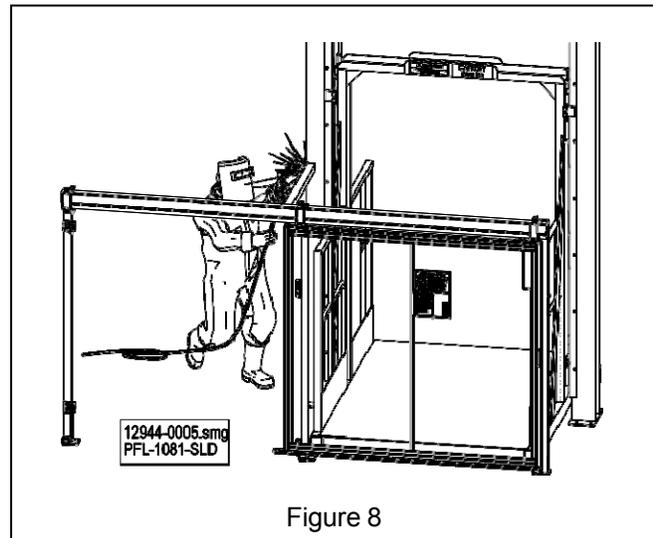
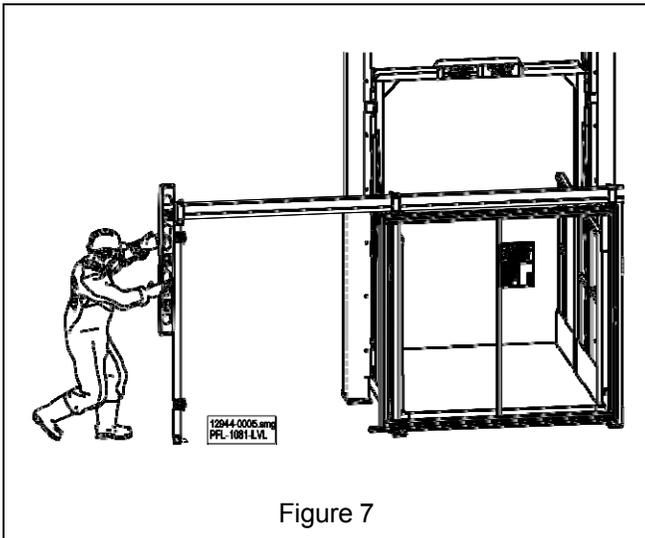
9. Plumb and square the gate using a plumb bob or a four foot or longer. **See Figure 7.**

NOTICE

Anchor hole depth should always be deeper than the length of the anchor bolt.

Recommended wedge anchor size: 3/8" dia. x 3 1/2 long.

10. With the gate posts plumb, measure from gate post to VRC column. Cut two support braces and install as illustrated (1 1/2" x 1 1/2" steel angle or similar). **See Figure 8.**
11. Tighten all bolts.
12. Verify the gate operation.
13. Weld the steel angle header to gate posts.
14. Check the gate. Adjust the gate panel as necessary. Additional bracing may be necessary.
15. Install and wire the gate interlock.
16. Verify the proper gate panel and interlock operation.
17. Verify the safe gate operation with the carriage present and not present at the gate location.



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TWO-LEVEL VRC LIMIT SWITCH MOUNTING INSTRUCTIONS

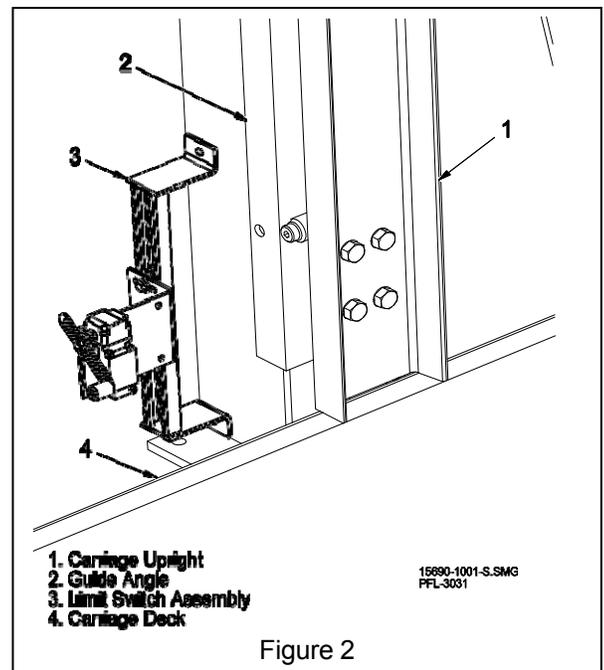
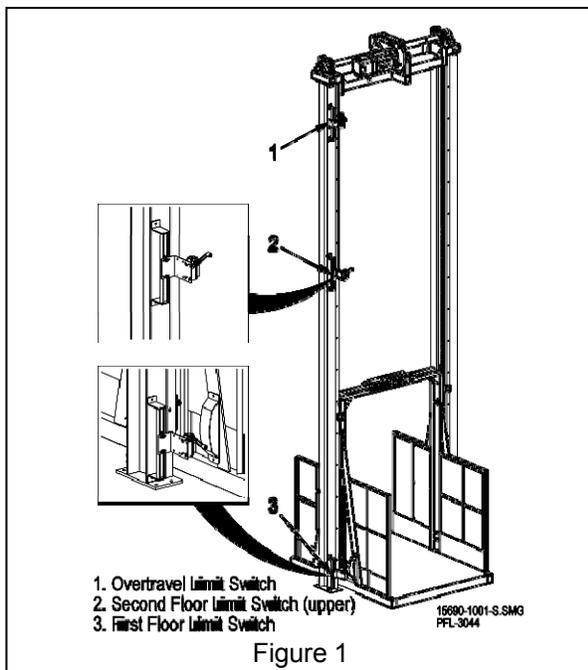
The standard two-level VRC incorporates one switch at each level to stop the carriage and one upper over travel switch. The following instructions and diagrams show the most commonly used method of mounting these switches. Due to varying site conditions, the instructions and diagrams may not apply to an application due to possible site variances.

1. LOWER LEVEL - With the carriage resting on the lowest level, tack weld or clamp a limit switch assembly (L-bracket with limit switch mounted) to the column. The unistrut mounts should be positioned flush with the outside edge of the column. Do NOT weld to the column at this time. **See Figure 2.**
2. Position the limit switches actuator plate on the carriage so that the roller on the switch arm of the limit switch assembly makes contact with the center of the bottom of the actuator plate. Take a measurement from the carriage deck to the top of the limit switch actuator plate. This measurement will be needed for mounting the upper level limit switch. **See Figure 3.**
3. It is recommended that the overhang side of the plate be free to make contact with the limit switch arm. The arm is adjustable, and repositioning may be required to ensure the proper contact.
4. UPPER LEVEL - Place a straightedge on the upper level and extend it to the column. **See Figure 4**
5. Placement of two to three feet of the straight edge on the floor should help to ensure a level reading. This mark shows where the carriage deck will be when the lift is stopped at that level.
6. Using the measurement taken in Step 2, measure up the same number of inches from the mark you placed on the column in Step 3. **See Figure 5.**

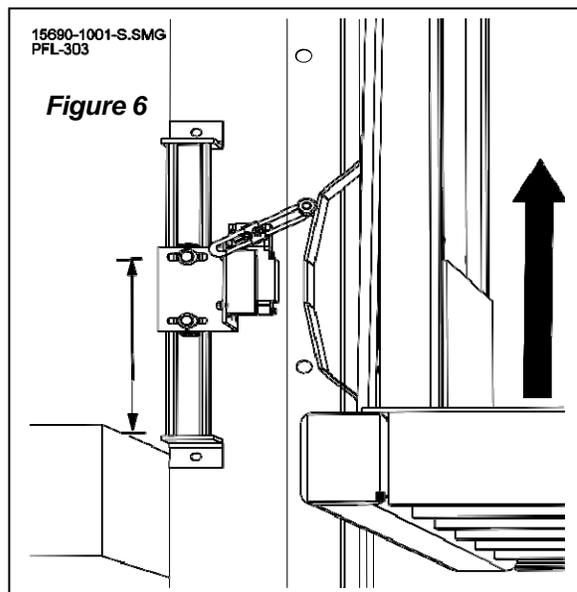
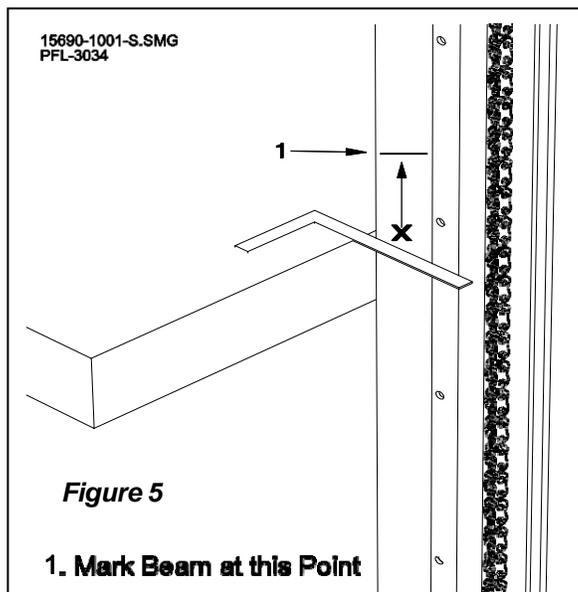
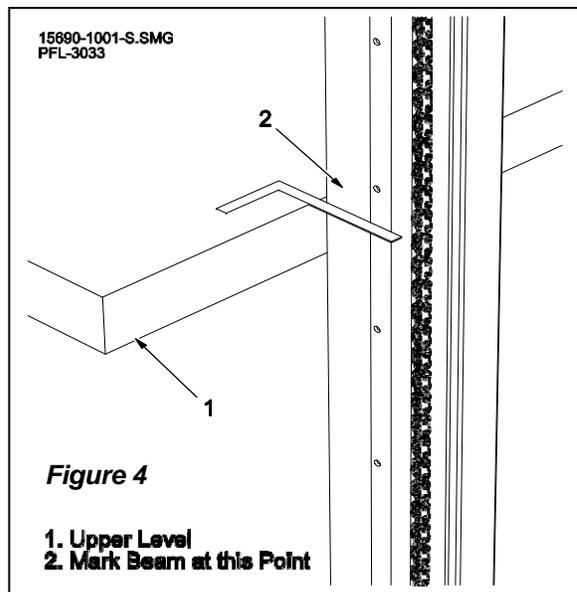
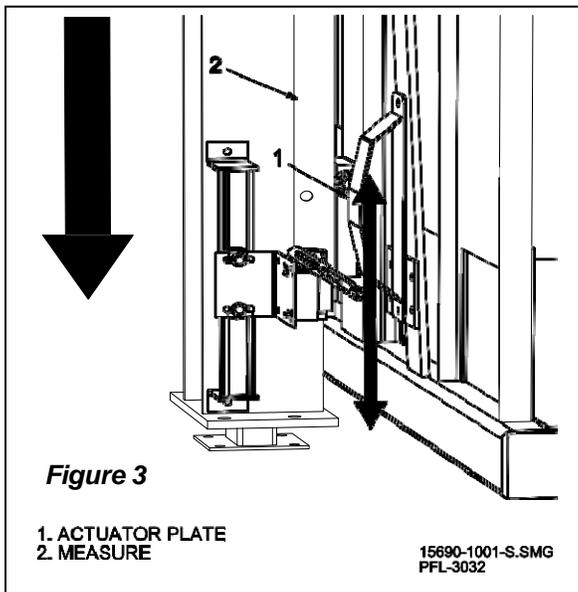
The upper level limit switch assembly will be centered on this point flush to the outside edge of the column and will operate in the upward direction off the top of the actuator plate. **See Figure 6.**

Weld the unistrut mounts to the face of the column. (This illustration is for alignment purposes only, and actual field application may vary.)

The over travel limit switch can now be installed.



Two-Level VRC Limit Switch Mounting Instructions



 **CAUTION**

Do not weld on column guide angle.

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



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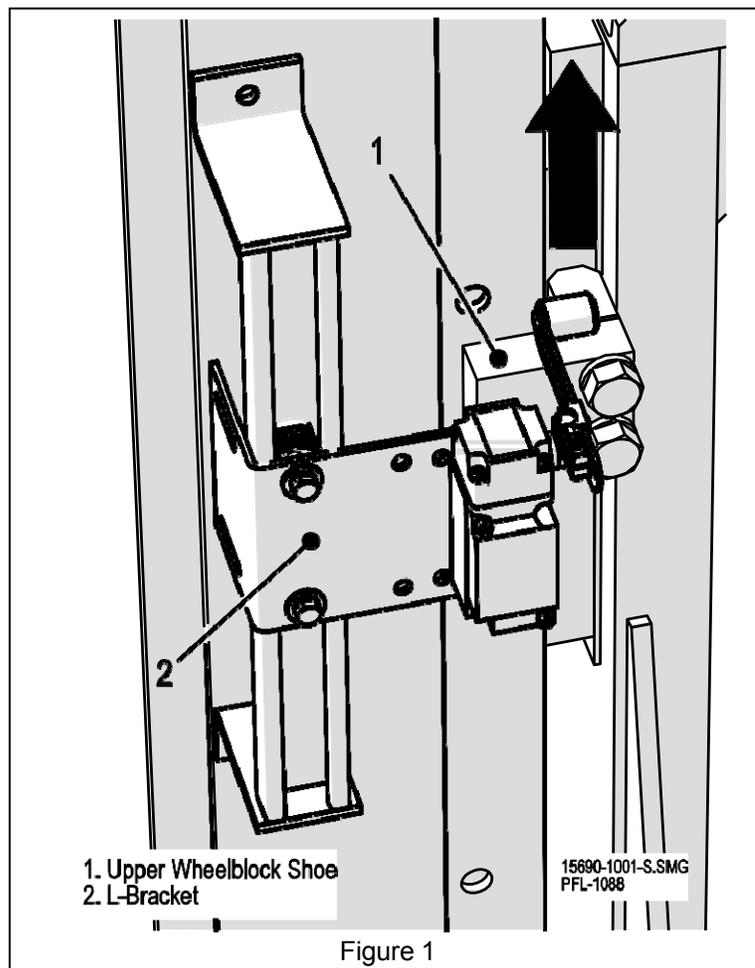
OVER TRAVEL LIMIT SWITCH MOUNTING INSTRUCTIONS

Measure the distance from the top of the carriage deck to the top of the wheel block shoe. Take this distance and measure from the upper floor level mark you made on the column in Bulletin 15709-0011, Step 2, and again mark the column.

At this point, weld the over travel limit switch bracket so the unistrut is centered on this mark and the limit switch roller will contact the wheel block shoe. **See Figure 1.**

NOTICE

For over travel, the limit switch L-bracket has to be loosened from the unistrut and mounted in the proper position to allow over travel above the upper stop limit switch. See Figure 1.



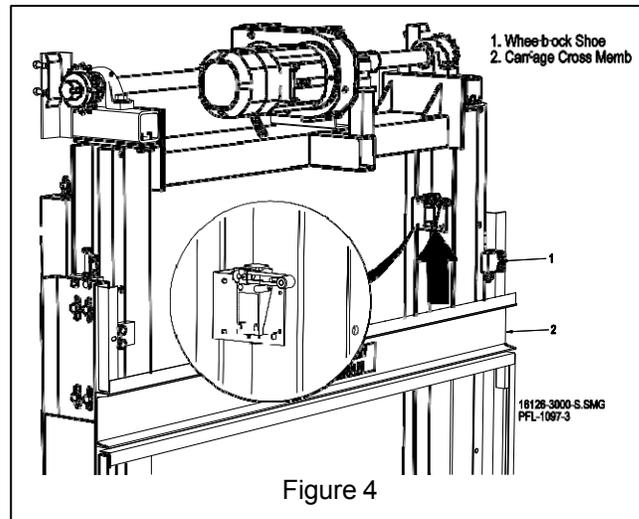
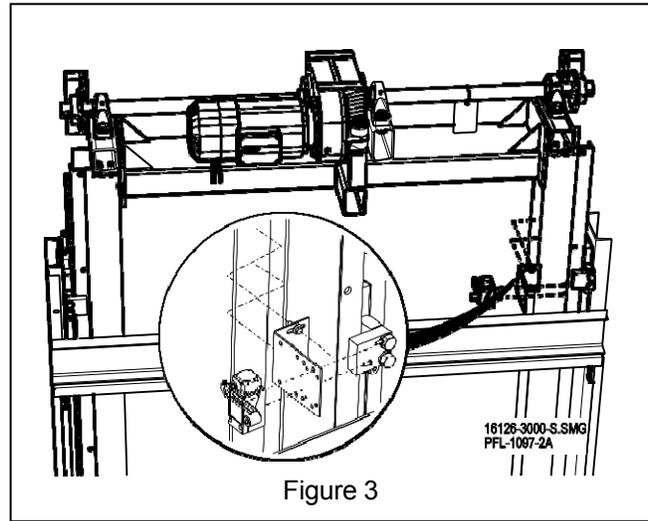
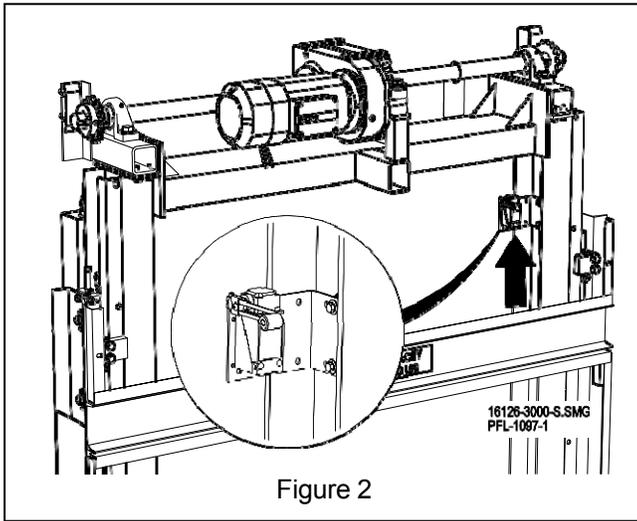
Over Travel Limit Switch Mounting Instructions

CANTILEVER OVER TRAVEL LIMIT SWITCH MOUNTING APPLICATIONS

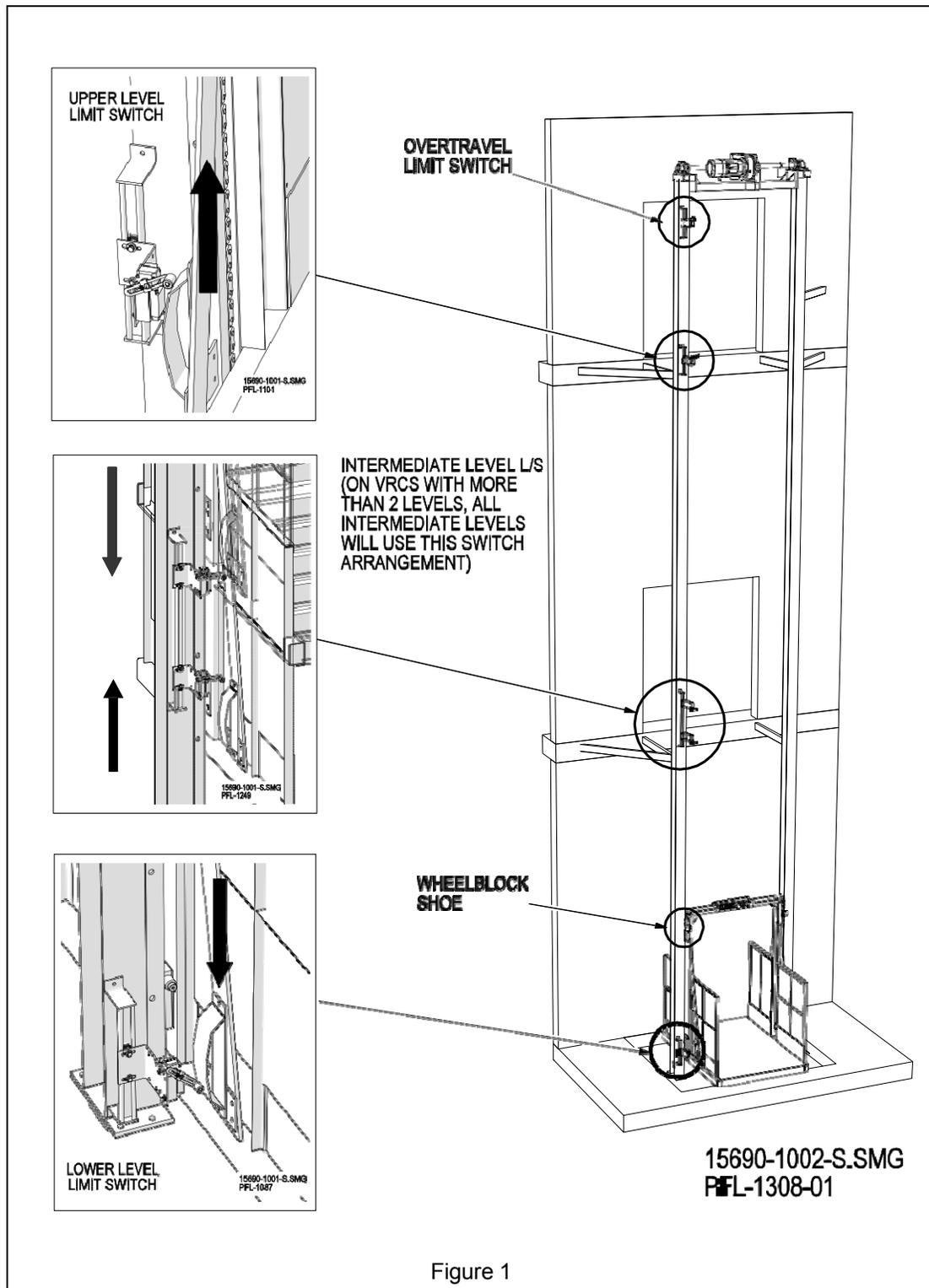
Cantilever lift applications are typically required due to the lack of overhead site space. This creates various cantilever carriage configurations. We recommend mounting the switch assemblies inside of the lift column.

See Figures 2, 3, and 4.

Where enclosures are mounted on the carriage, you may want to use the carriage cross member or carriage enclosure as an alternate to the actuator plate. See Figure 4.



THREE-LEVEL OR MORE LIMIT SWITCH MOUNTING INSTRUCTIONS

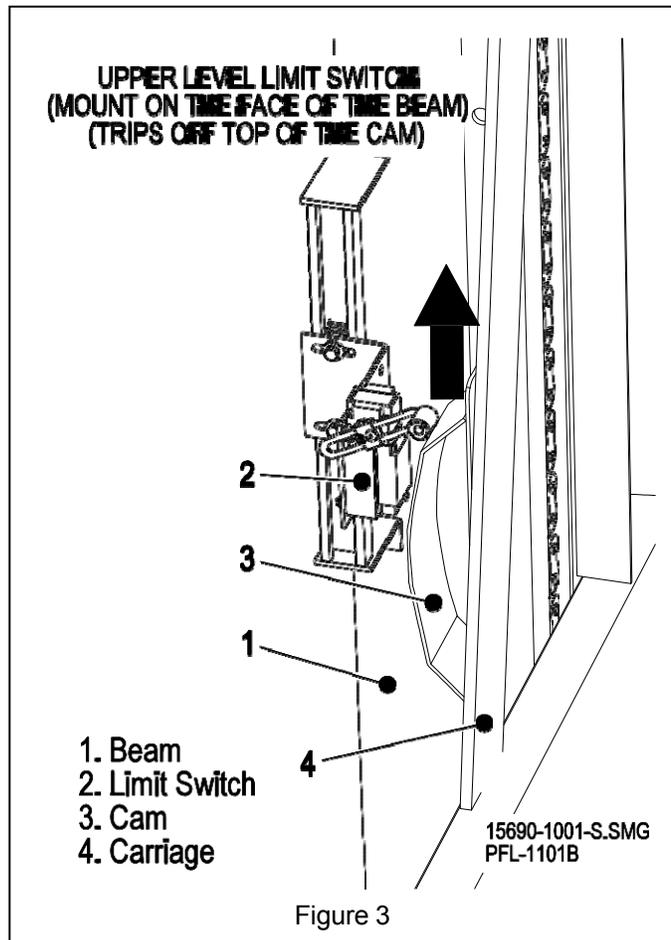
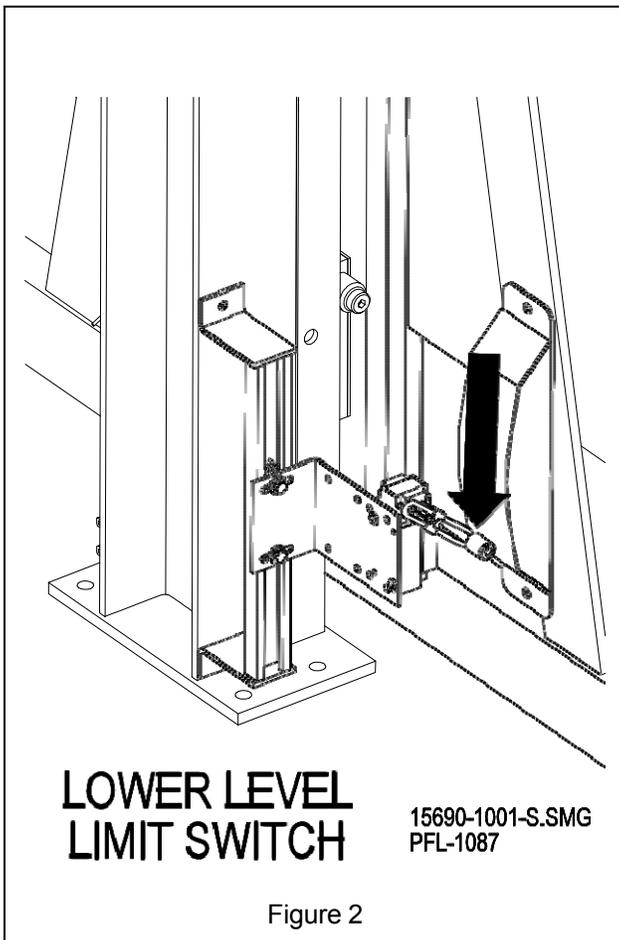


Three-Level or More Limit Switch Mounting Instructions

LOWER & UPPER FLOOR LIMIT SWITCHES

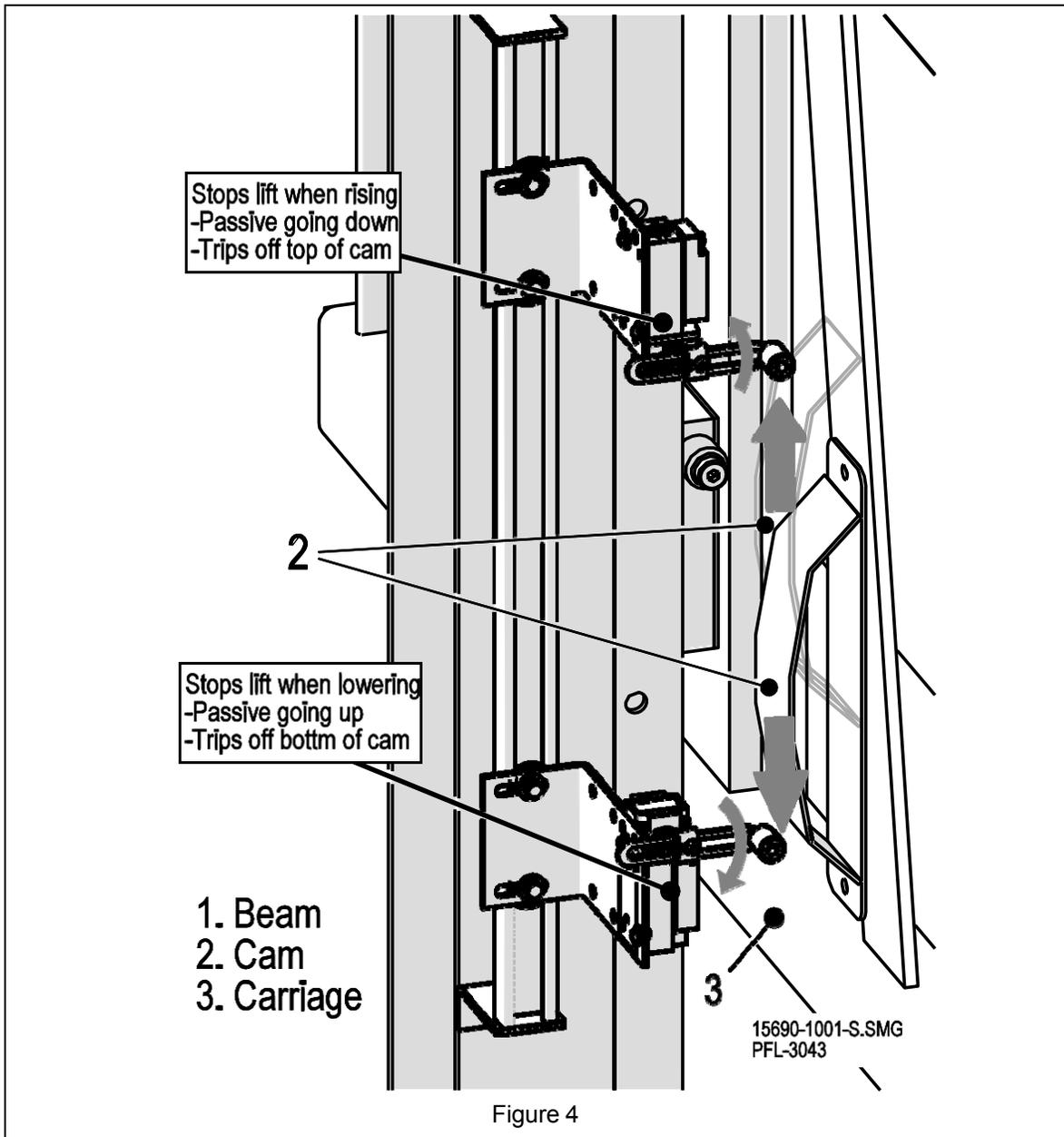
(EXAMPLE FOR A 3-LEVEL LIFT WOULD BE the 1ST floor for the lower and the 3RD floor for the upper limit switch)

1. With the carriage at the lower level hold the lower limit switch assembly on the beam. The limit switch assembly has only one limit switch on it. (Do not weld assembly to the beam at this time.) Tack weld or clamp the limit switch assembly in place. Place the actuator cam on the carriage so that the roller on the limit switch is on the center of the actuator cam. Then weld the actuator cam unistrut or actuator cam solidly onto the carriage. **See Figure 2.** Keep the bracket clear of the carriage upper wheelblock shoe.
2. Install the lower floor level limit switch assembly as illustrated. The lower floor limit switch is actuated off the bottom of the carriage cam, and the upper floor level limit switch is actuated off the top of that same cam.
3. With the carriage at the upper level install upper top floor level limit switch assembly as shown in **Figure 3.** Verify that it clears all lift bracing and/or carriage lift drop cords. Keep the bracket clear of the carriage upper wheelblock shoe.
4. After final adjustments securely weld the carriage cam. Tighten the bracket fasteners. As final step if necessary is to tack weld the limit switch brackets in place.



LIMIT SWITCH ARM ACTUATION DIRECTION

Install intermediate floor level limit switch assembly as described above (It may have two limit switches). See Figure 4.



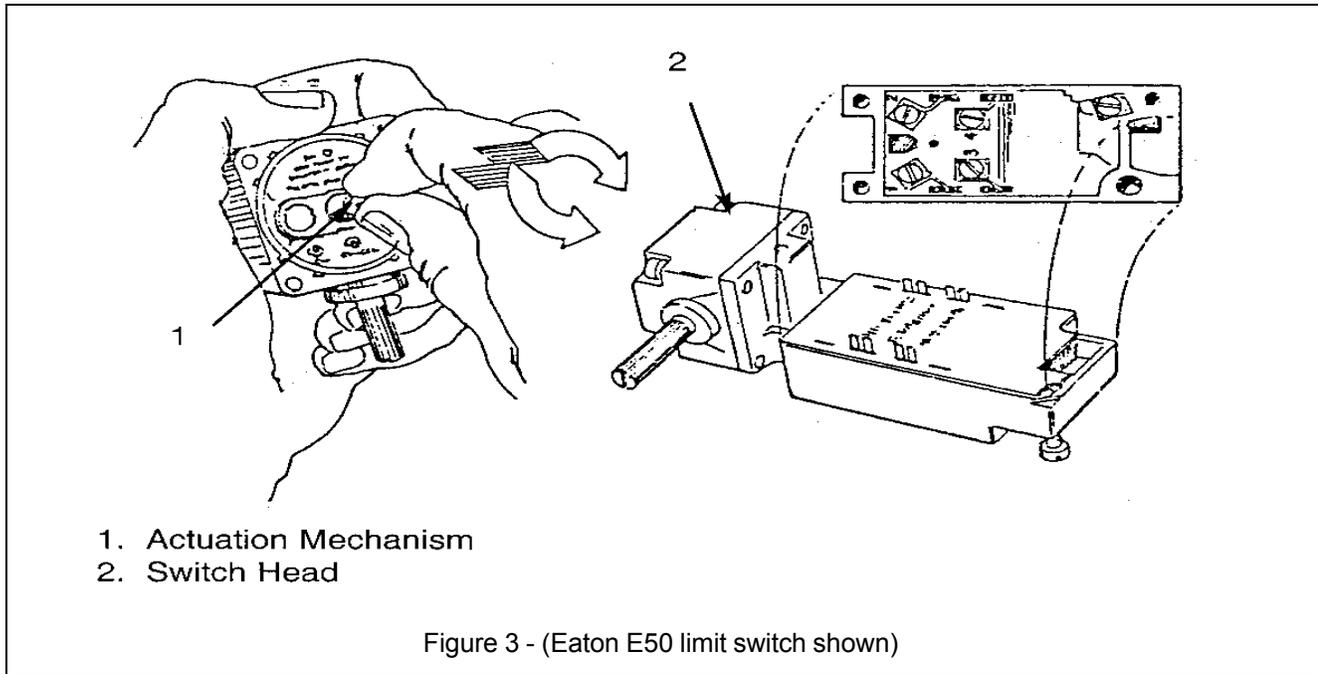
NOTICE

Limit switch actuation direction may have to be changed. Switches have to be passive in one direction. See the manufacturer's documentation to change actuation direction, if necessary.

Three-Level or More Limit Switch Mounting Instructions

On units with **intermediate floors**, it may be necessary to change switch actuation direction. Refer to the limit switch manufacturer's instructions. For example see **Figure 3** (Eaton E50 limit switch shown).

1. To change actuation direction, remove switch head (Eaton E50 limit switch shown). See **Figures 4, 5 and 6**.
2. Change actuating control mechanism to desired actuation direction. CW, clockwise, switch will activate in clockwise direction. CW - CCW switch will activate in both directions (used in this position for upper and lower switches); and CCW, counterclockwise, switch will activate when turned counterclockwise. The switch has four settings that can be changed by pulling actuation mechanism inside the switch head, rotating actuation mechanism, and allowing activator to reset.
3. You can tell switch actuation direction by turning it. There should be a **“click”** when switch activates.

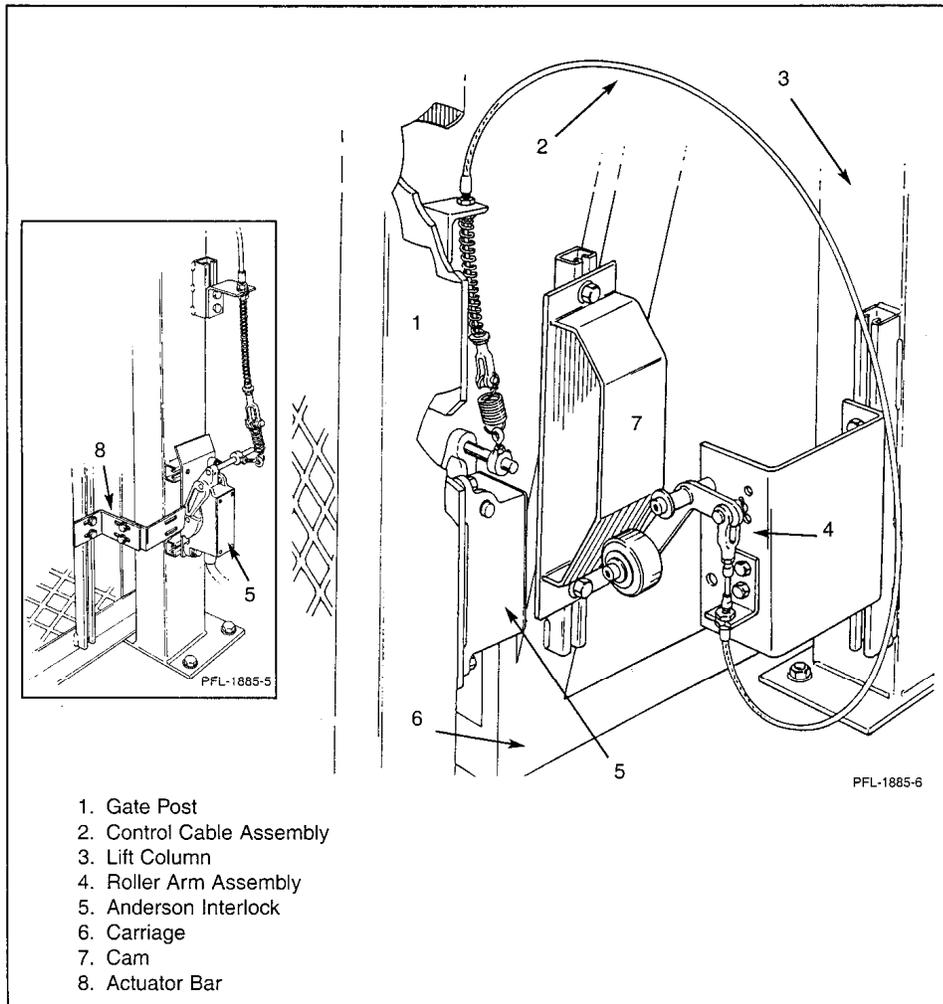


ANDERSON CABLE INTERLOCK

FOR USE ON VERTICAL ACTING & BI-PANEL VERTICAL ACTING GATES

NOTICE

Read PFlow Service Bulletin 15709-0029-B284
"Gate Cable Interlock Installation" before starting installation.



If you have any questions or require assistance, please contact the Product Support Department.



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Notes

INTERLOCKS & GATE SWITCHES

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.

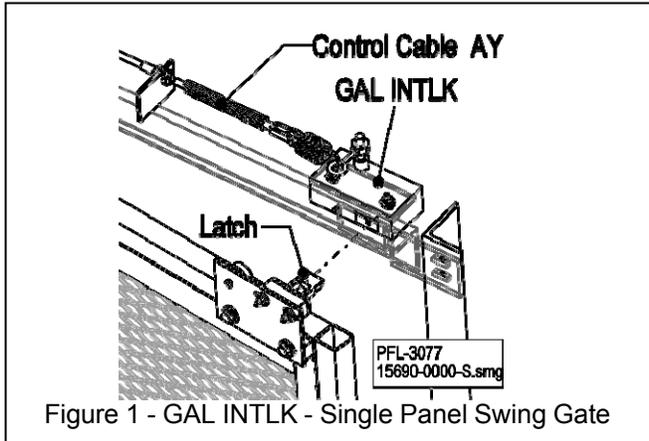


Figure 1 - GAL INTLK - Single Panel Swing Gate

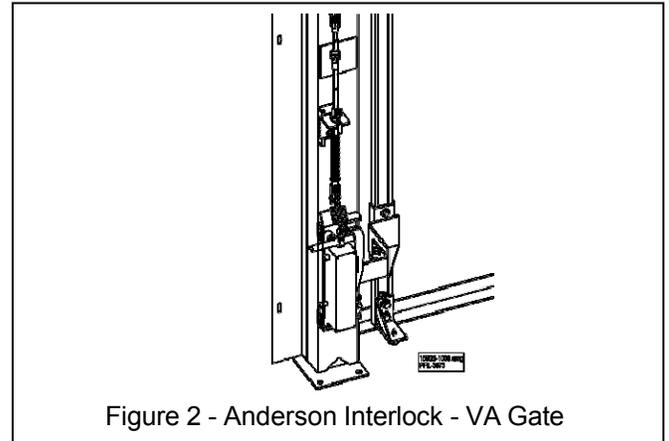


Figure 2 - Anderson Interlock - VA Gate

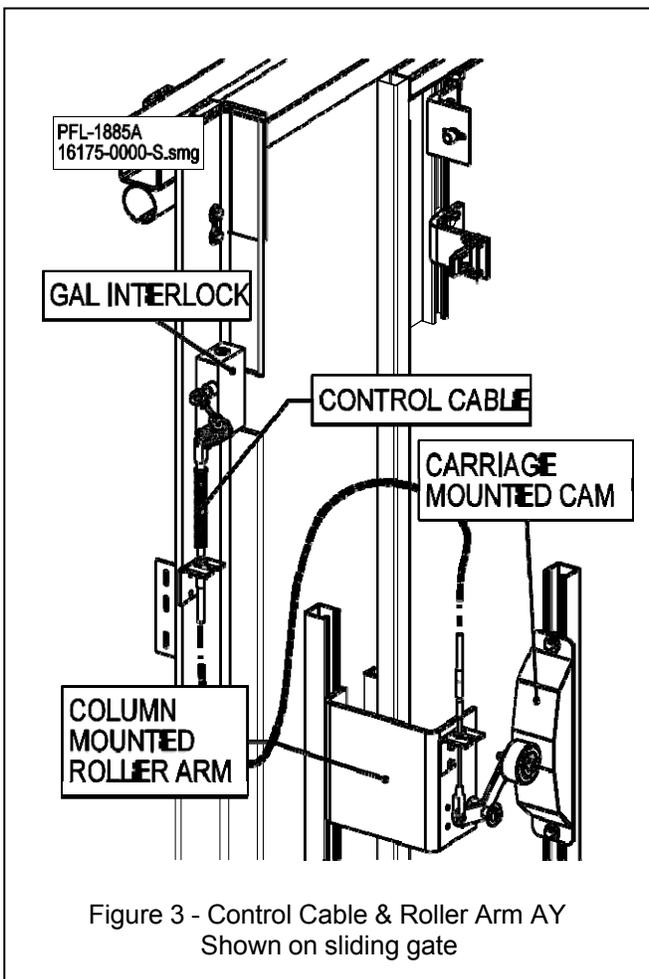


Figure 3 - Control Cable & Roller Arm AY
Shown on sliding gate

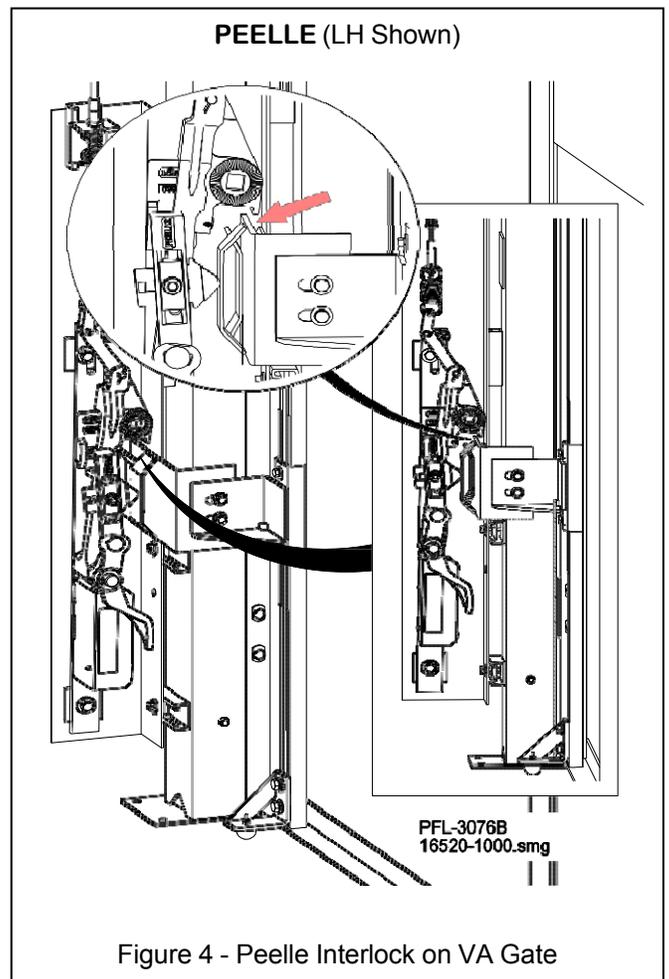
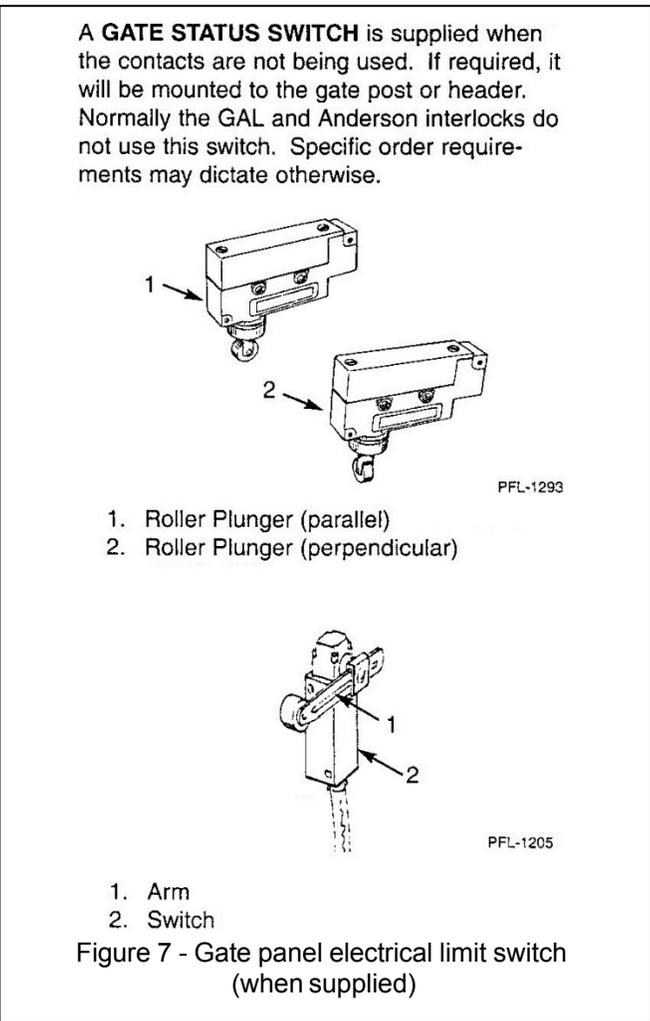
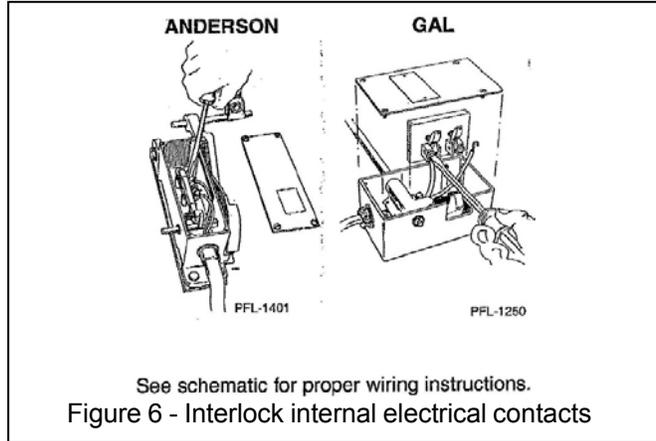
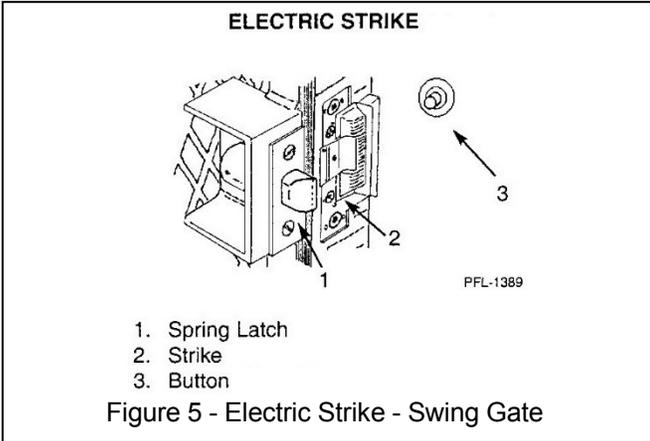


Figure 4 - Peelle Interlock on VA Gate



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GATE CABLE INTERLOCK INSTALLATION

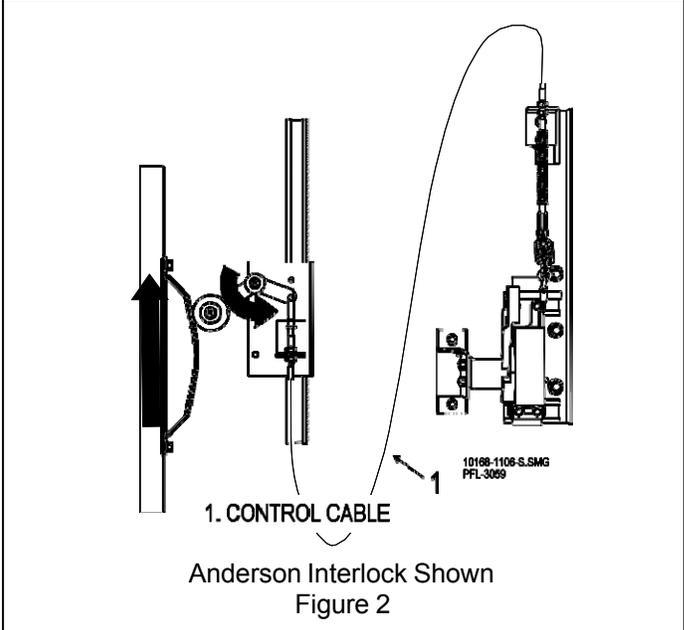
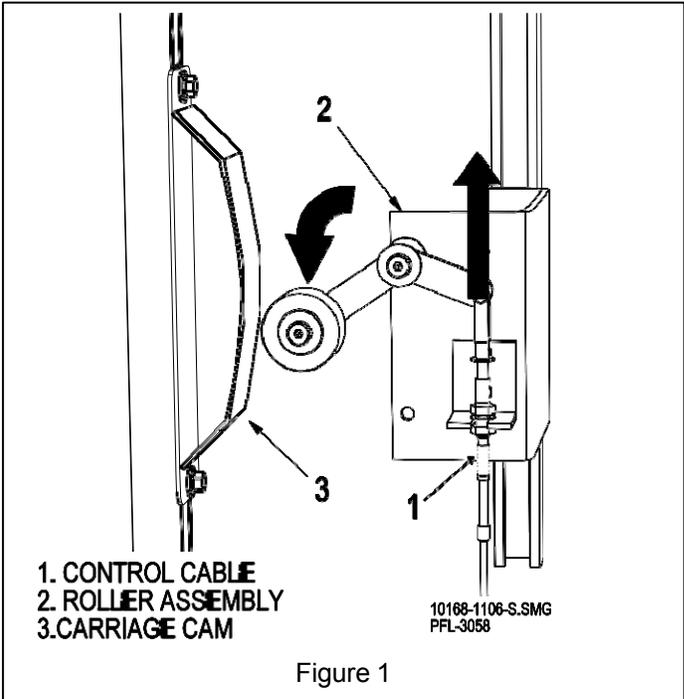
NOTICE

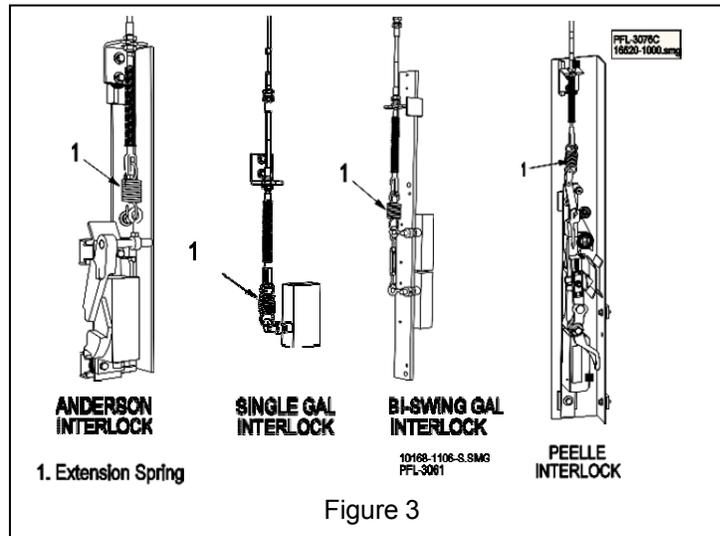
Read this bulletin in its entirety before starting the installation.

GENERAL DESCRIPTION

The cable interlock consists of four main items:

1. Carriage Cam - The cam is mounted on the carriage to activate the roller assembly. It must be positioned to allow the roller to move freely on the inclined cam face and to allow the control cable to activate the interlock. **See Figure 1.**
2. Column Mounted Roller Assembly - The roller assembly is mounted on the lift column. It must be positioned to limit the control cable travel. **See Figure 1. Note:** Do not allow the clevis to bottom out or overextend. The required travel is approximately +/- 3/4". The maximum cable travel is 2".
3. Control Cable - The control cable is a utility cable with threaded stainless steel end rods. The cable has a maximum 2" stroke. **See Figures 1 and 2.**
4. Gate Cable Interlock Assembly - The gate cable interlock is attached to the gate post. The stroke of the cable is adjusted to permit the interlock to release the gate latch. **See Figure 3.**





⚠ WARNING

- **If travel is extended beyond 2". cable damage will occur.**
- A gradual or sudden increase in the no-load friction (cable disconnected at both ends) of a cable is an indication of a pending or present performance problem. The cable should be replaced.
- A gradual or sudden decrease in the usable stroke of a cable is an indication of a pending or present performance problem. The cable should be replaced.
- Cables which have moisture inside of them and/or have become frozen should be replaced. Do not apply heat to thaw or dry cables.
- Cables are lubricated for the life of the cable. Do not remove the seals or lubricate the cable.
- Cables are designed to be non-repairable. Do not attempt to repair the cable.

⚠ CAUTION

- Cables are designed to be contaminant resistant, not contaminant proof. Protect cables from contaminants such as gas, oil, diesel fuel, water, dirt, and chemicals.
- Protect the cable from physical damage by paint, kinking, vibration, etc., which may damage cable.
- The swivel angle must be centered within the available swivel angle.
- The usable travel must be centered within the available stroke.
- Do not bend cable sharply. **Cable has a minimum bend radius for 4".** If the cable is too tight it may not operate properly.

INTERLOCK ASSEMBLY ADJUSTMENT

The tension on the extension spring should be adjusted by positioning the cable on the angle bracket. The activation of the interlock is also adjusted by the position on the set collar. See **Figure 4**.

CABLE ADJUSTMENT WITH ROLLER ARM

1. Adjust the carriage cam to allow $\pm \frac{3}{4}$ " cable travel (2" maximum cable travel). Make sure the roller wheel clears the edge of the cam. Center the cable travel at the center of the full cable stroke by positioning the cable in the bracket angle. See **Figure 5**.
2. Edge of cam must not be past the center of the wheel toward the bracket. This could catch the wheel at the cam edge and break the cable clevis. See **Figure 6**.

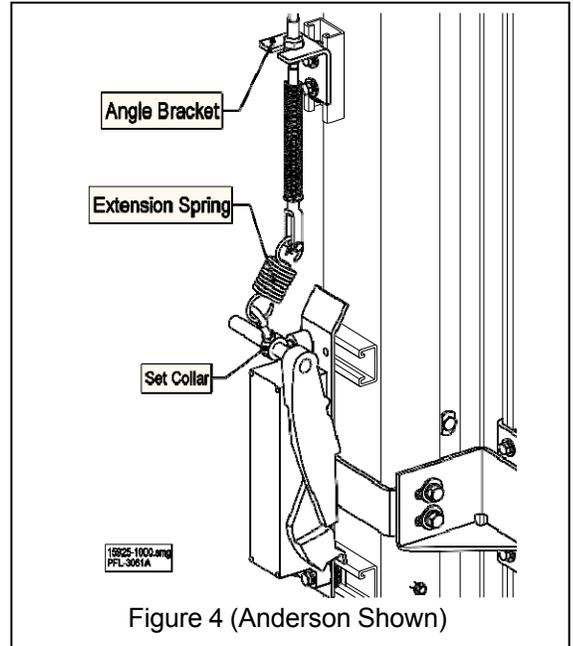


Figure 4 (Anderson Shown)

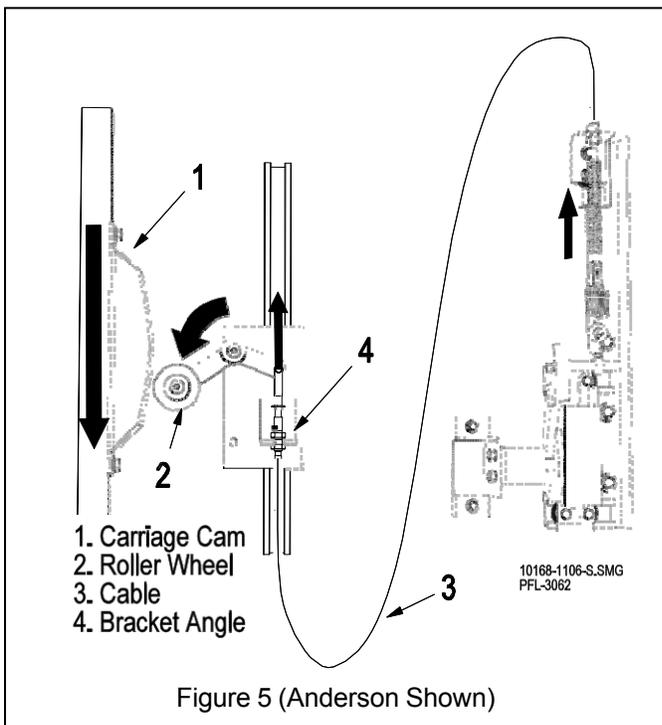


Figure 5 (Anderson Shown)

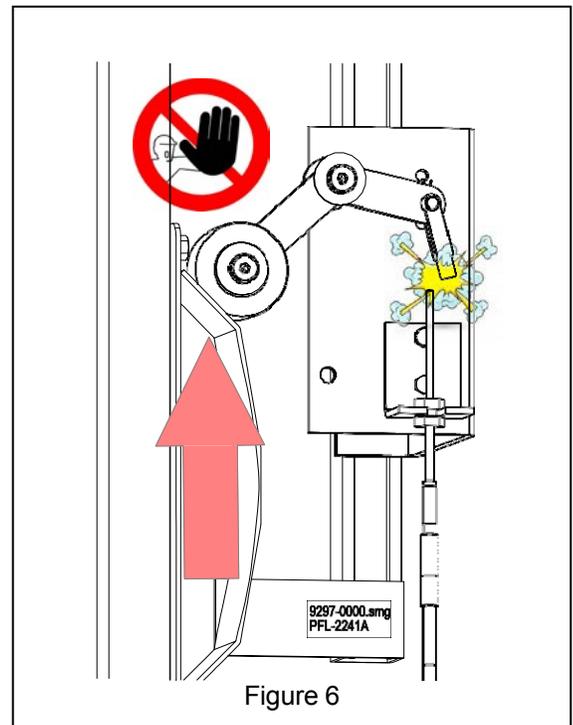


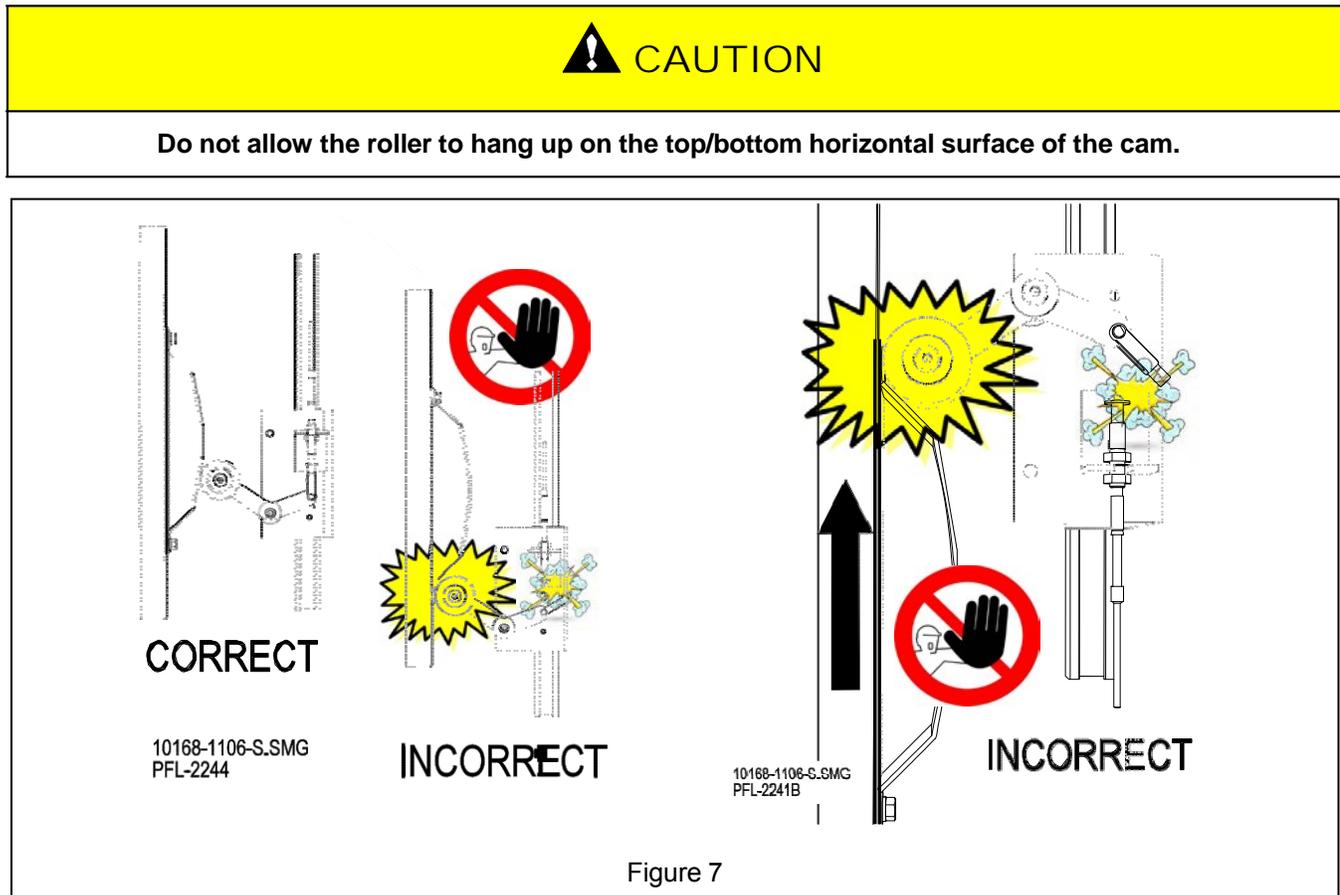
Figure 6

⚠ WARNING

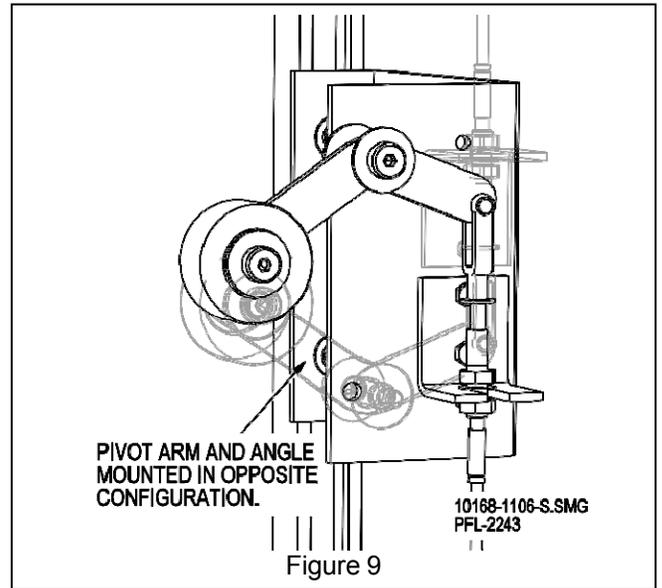
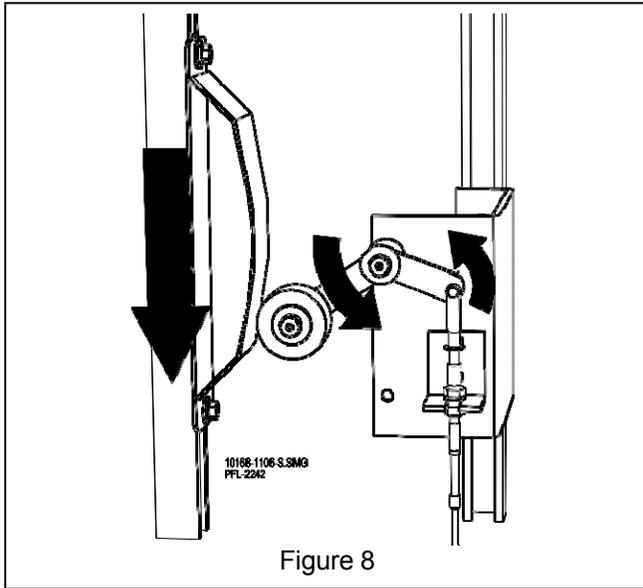
Proper engagement of the roller and cam is critical. The roller arm should control the cable out of the sleeve. Improper alignment could cause the roller arm to push the cable into the sleeve causing it to bend and break.

POSITION ON THE ROLLER ARM ON THE LIFT COLUMN

1. The position of the roller on the cam is very important. The roller must roll freely on the cam incline. **See Figure 7.**



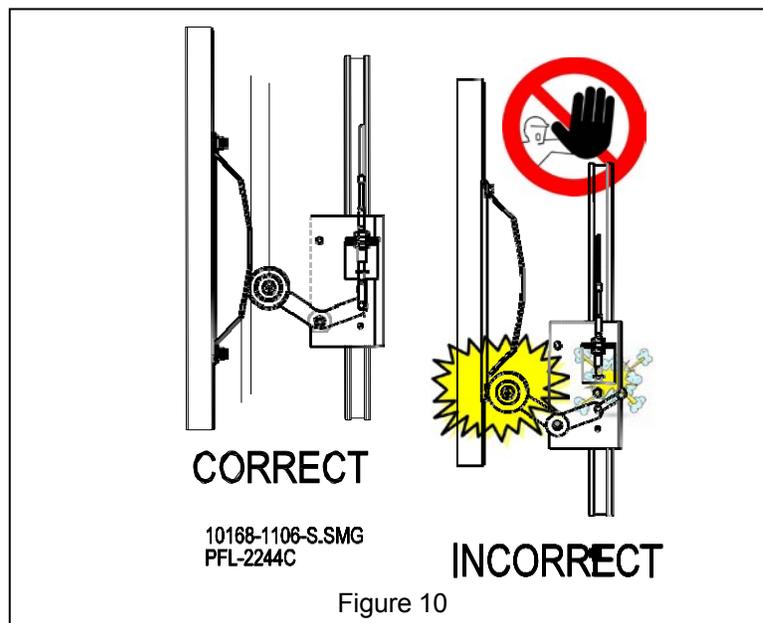
2. At the top and bottom levels, the roller arm assembly should be orientated so the cam hits the roller wheel arm in the pivot direction. **See Figure 8.**
3. If you need to change the roller assembly to an opposite hand, unbolt the angle and pivot arm and reassemble in new location. **See Figure 9.**



NOTICE

Only on the intermediate levels, the cam will hit the roller arm in both directions, so alignment is important. See Figure 7.

4. The edge of the cam must past center of the wheel (away from bracket) to allow pivot arm to rotate. See Figure 10.
5. If cam hits under the wheel not allowing the arm to pivot, the cable will break. See Figure 6.



Gate Cable Interlock Installation

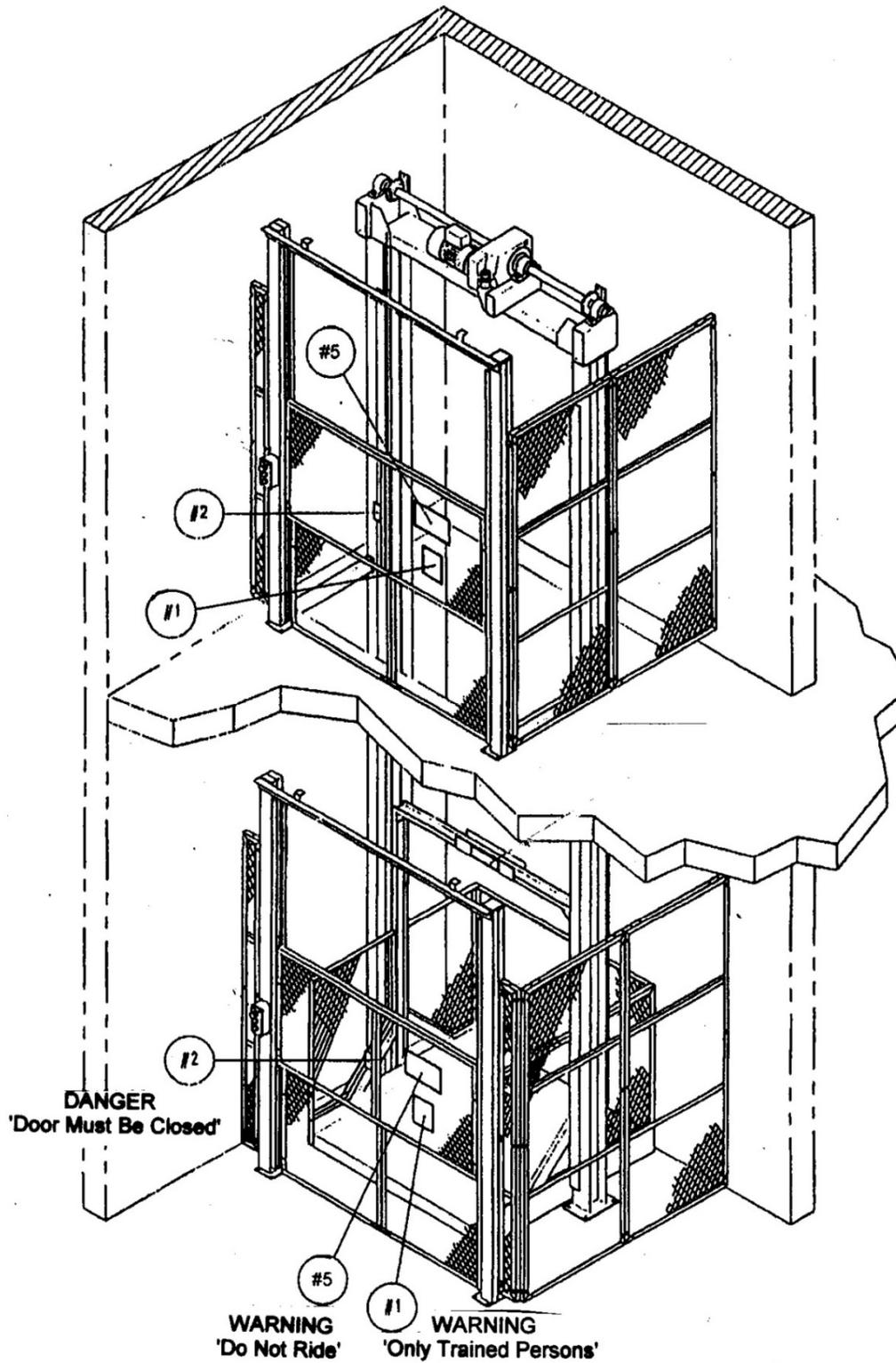
If you need assistance, please call PFlow Industries, Inc. Product Support Department..



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Signs

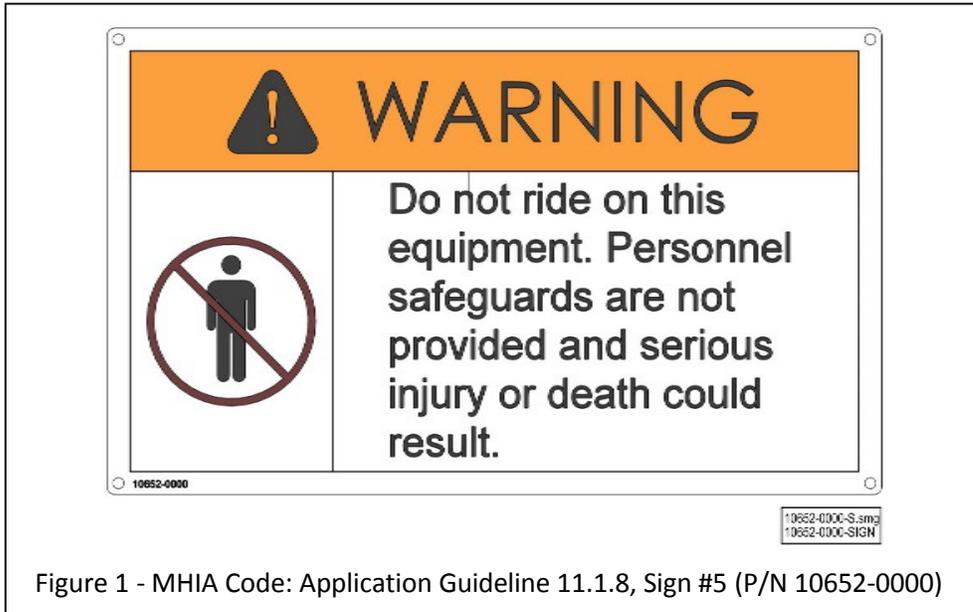


Figure 1 - MHIA Code: Application Guideline 11.1.8, Sign #5 (P/N 10652-0000)

If required, contact the PFlow Industries Service Department to discuss and or document any field bracing modifications to VRC lift bracing of your unit. Note that additional time and expense may be involved in obtaining any updated documentation.

Figure 2 - MHIA Code Application 11.1.4 Sign #1.

Figure 3 - MHIA Code Application 11.1.5 Sign #2.

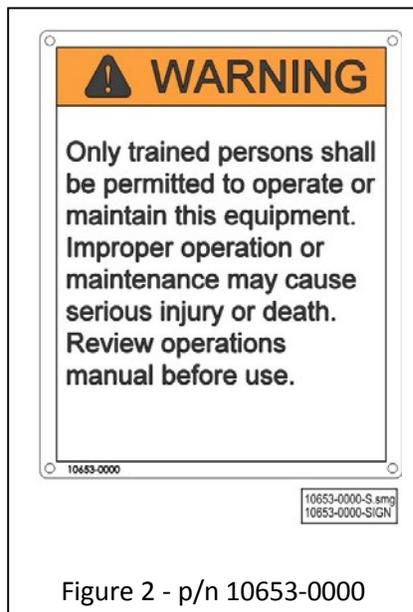


Figure 2 - p/n 10653-0000



Figure 3 - p/n 10654-0000



Signs are available in Spanish. Contact the PFlow Industries, Inc. Product Support Department.

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



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Signage Locations for Existing Doors

Notes

ENCLOSURE PANELS

1. In accordance with ANSI B20.1, PFlow Industries supplies standard enclosure panels to be installed around the unit (VRC) as required by site conditions. Our enclosure panels are manufactured of a 1½” steel angle frame and 15 gauge flattened expanded metal which will reject a ball 2” in diameter.
2. The PFlow VRC general arrangement (GA) drawing provides a “Plan View” for each level. This shows the proper placement and appropriate size for layout and installation purposes.

NOTICE

At enclosure installation verify site & state code compliance.

FULL HEIGHT ENCLOSURES

1. Applications requiring full height enclosures (FHE) have an additional enclosure drawing in the shipping packet.
2. When stacking panels, as in full height applications or a transom above a gate, panels without legs are used on top of our regular panels. Brace adequately to support and stabilize the enclosure panels.

INSTALLATION

1. Modifications for site obstructions are best done in the field by the installer. **See Figure 1.**
2. Standard panels are 8’ high in compliance with OSHA requirements. Total height includes 1½” legs. These panels are located and lagged to the floor. **See Figure 2.**

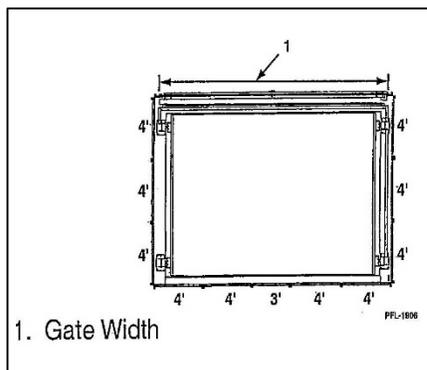


Figure 1

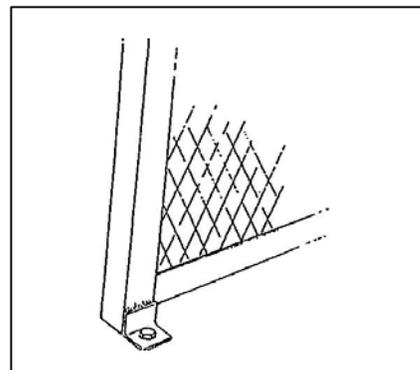


Figure 2

3. Enclosures must be braced to the VRC or building structure by the mechanical installer. Use of structural angle is suggested.

- 4. Stiffeners are provided whenever two panels in excess of 6" meet. **See Figure 3.**
- 5. Filler panels are used to fill a gap of less than 6". **See Figure 4.**

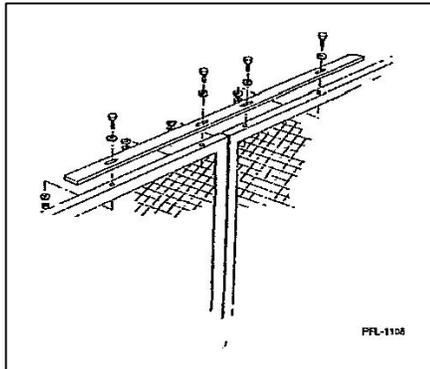


Figure 3

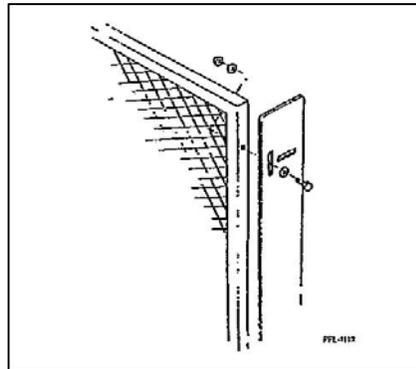


Figure 4

- 6. Corner angles are required for 90° attachment of panels. **See Figure 5.**
- 7. Wall attachment kits are provided when a gate or panel meets an existing wall. **See Figure 6.**

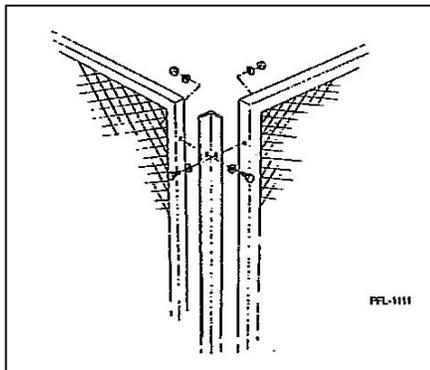


Figure 5

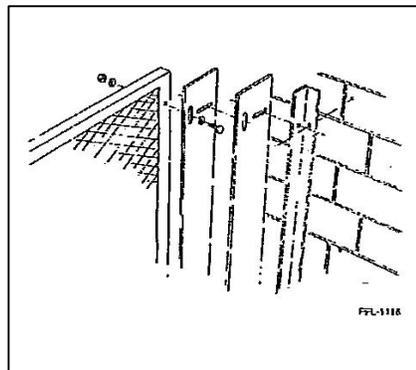


Figure 6

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



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SPLICED COLUMN ASSEMBLY INSTRUCTIONS

NOTICE

Columns are match marked (i.e. A1, B1). The location of the columns is not determined by these marks. The column letter is only used to correctly assemble a spliced column. The spliced parts of a the column are lettered as shown in Figure 1, and by the corresponding letters shown in Figures 2 and 3.

 CAUTION

Straddle Applications – Right and left columns are determined by placing the columns with the guide angles to the front inside and the chain tube to the back.

Cantilever Applications – Columns are placed in the opposite position with the guide angles facing outward and chain tubes remaining to the rear.

NOTICE

VRC lift shown partially assembled to better depict the marking system. See Figures 1 and 2.

NOTICE

If there are more than two column pieces per column, see Figure 2 or 3 to determine placement of spliced pieces.

Spliced Column Assembly Instructions

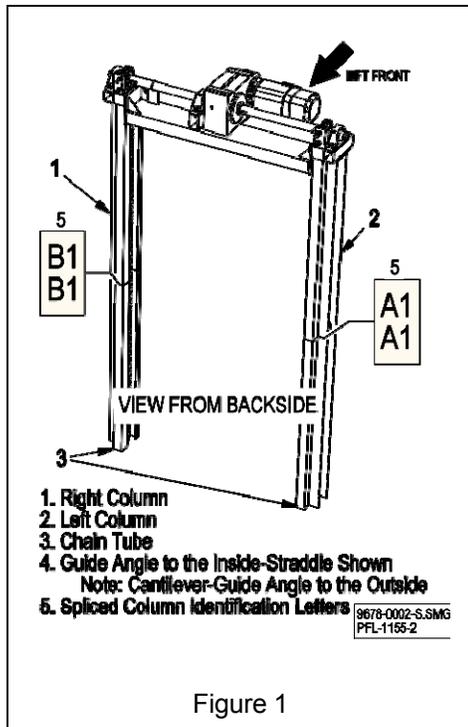


Figure 1

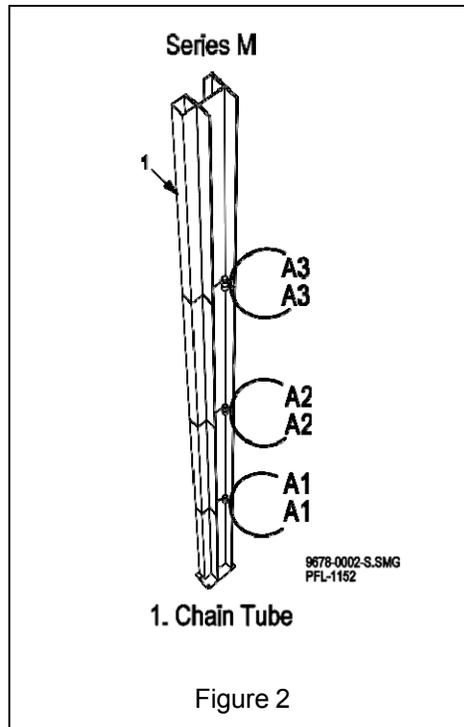


Figure 2

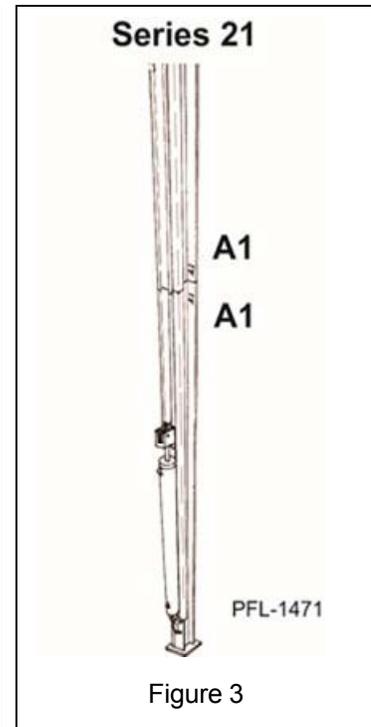
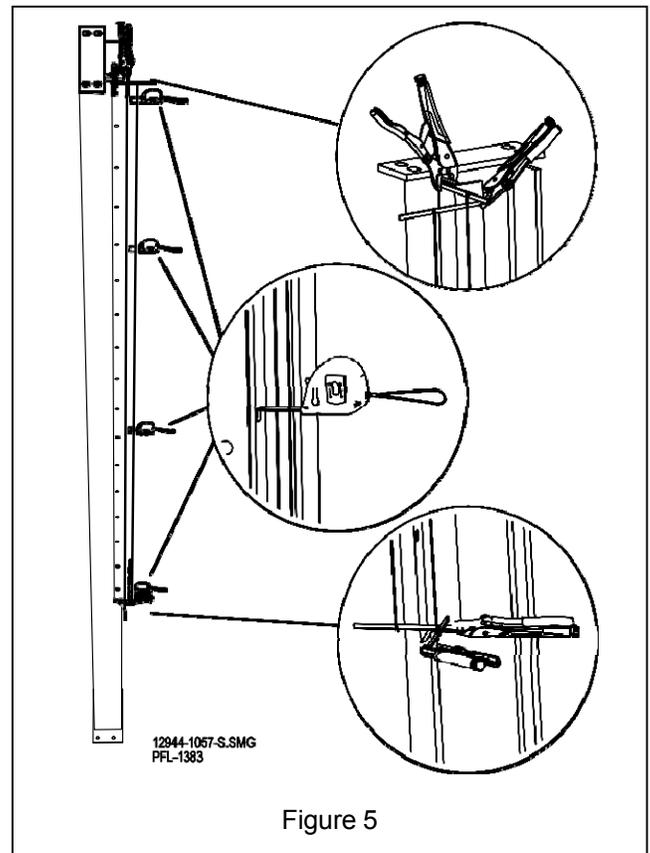
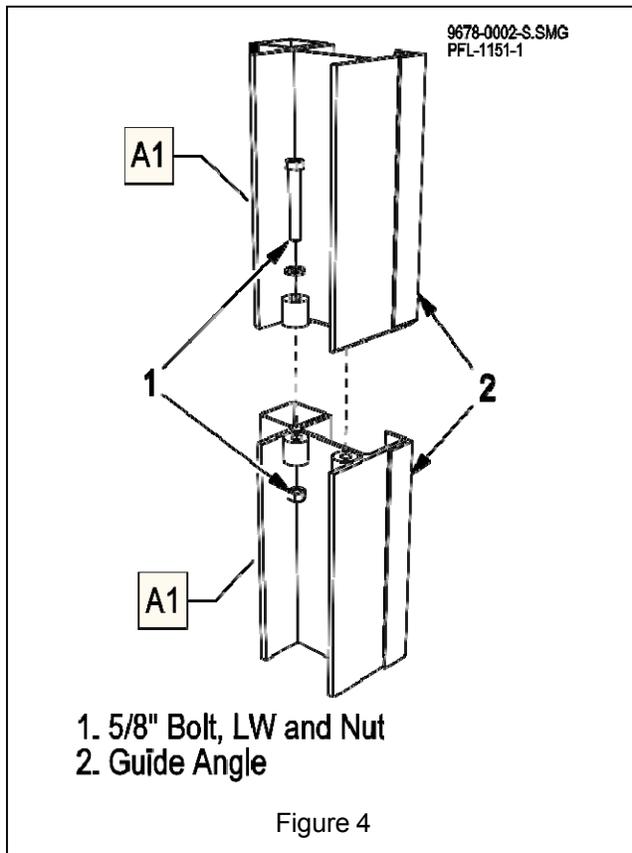


Figure 3

1. If possible align and weld each column on the ground. Then position and align vertically.
2. Assemble spliced column pieces, **See Figure 4**. Use 5/8" bolts and nuts (two per splice) to help hold and align each piece of the column.
3. Tack weld spliced column pieces together. The bolts alone are not strong enough to hold the column pieces together.
4. Temporarily brace the column. Verify that permanent bracing clears the carriage structure and carriage attachments (i.e. limit switch cams, junction box) during the carriage vertical travel.
5. If job specific bracing (i.e. seismic bracing) is to be provided, verify that the bracing meets the job specific bracing drawing layout. Any bracing variation may require local inspector approval.
6. Continue to bolt together and tack weld the rest of the column pieces, keeping the column temporarily braced until the column is completed assembled.
7. Assemble the second column in the same manner as steps 1 and 2.
8. Proper alignment is **CRITICAL** to the installation and operation of the VRC. Use a string to check alignment, **See Figure 5**. The column is to be aligned from two directions, **See Figure 5** inset. Keep equal distance between the string and the guide angle down both column sections.

WARNING

The column is shown unsupported for illustrative purposes only. Columns are to be supported as required by VRC loading and site condition.



9. After columns are properly aligned, do the final welding and bracing of the spliced column pieces. Bolts do not have to be removed after final welding.

CAUTION

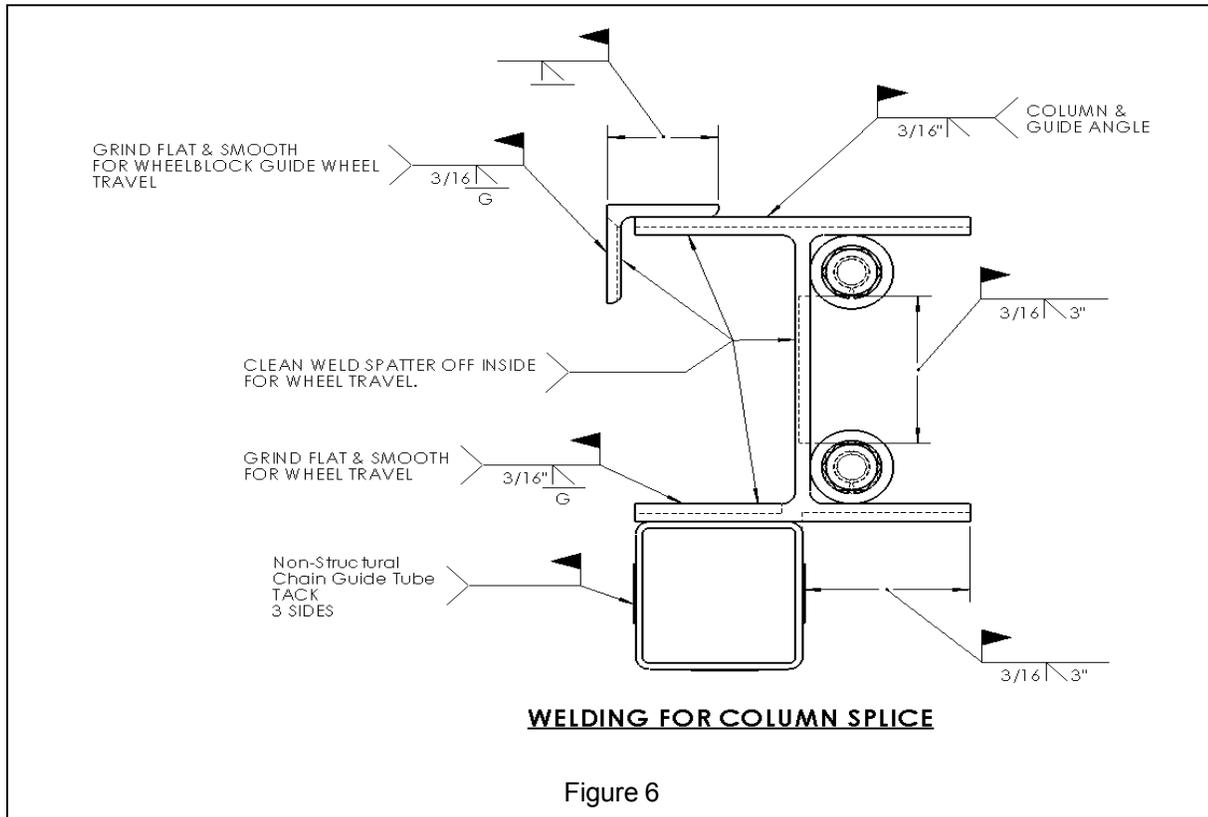
Too much heat introduced into the column will cause column to twist. Weld in a manner to allow heat to dissipate.

NOTICE

DO NOT weld on the inside of the guide angle surface.
It must be clean and clear weld splatter to allow the wheelblock to ride freely on the column flange.

Spliced Column Assembly Instructions

10. Weld the guide angle at the splice on the outside of the column and then grind it flat (this is to allow wheelblock shoe clearance for vertical carriage travel). Be sure to do short welds on the chain tube. The chain tube is not a structural member. It is provided as a chain guard. The chain tube is thin walled. You must be careful not to burn through the chain tube. **See Figure 6.**
11. Welding to be to latest edition of AWS D1.1.
12. Weld filler material to be minimum E70xx.
13. Clean and paint all welded areas.



These instructions are very general due to the variations in site construction conditions, available installation equipment, installer's abilities, and situations beyond PFlow Industries, Inc.'s control. Any variation that is safe and functionally correct for the equipment is acceptable.

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



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GATE IDENTIFICATION

Prior to shipment, all gate panels, posts, interlock components, etc., are color coded for each level. When two (2) gates are on one level, they will be coded with the same color. Please use the information available on the general arrangement (GA) drawing and in your installation manual to separate the components.

The colors per level will always remain the same. They are:

Level	Color
1 st (Bottom)	Green
2 nd	Yellow
3 rd	Red
4 th	Blue
5 th	Orange
6 th and higher	White

Each tag will be marked with the following:

- A. PFlow Serial Number
- B. Customer Project Number
- C. PFlow Part Number and Description
- D. Initials of Inspector
- E. Levels higher than 6 will include the number of the appropriate level

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



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Notes

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MATERIAL SAFETY DATA SHEET

F78XXL13851-4357
00 01

DATE OF PREPARATION
Dec 21, 2013

SECTION 1 — PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NUMBER

F78XXL13851-4357

PRODUCT NAME

Fast Dry Acrylic Enamel, FDA PFlow Blue VOC

MANUFACTURER'S NAME

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

Telephone Numbers and Websites

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

SECTION 2 — COMPOSITION/INFORMATION ON INGREDIENTS

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

SECTION 3 — HAZARDS IDENTIFICATION

ROUTES OF EXPOSURE

INHALATION of vapor or spray mist.

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

EFFECTS OF OVEREXPOSURE

EYES: Irritation.

SKIN: Prolonged or repeated exposure may cause irritation.

INHALATION: Irritation of the upper respiratory system.

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

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

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

SIGNS AND SYMPTOMS OF OVEREXPOSURE

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

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

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

None generally recognized.

CANCER INFORMATION

For complete discussion of toxicology data refer to Section 11.

HMIS Codes

Health	2*
Flammability	3
Reactivity	0

SECTION 4 — FIRST AID MEASURES

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

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

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

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

SECTION 5 — FIRE FIGHTING MEASURES

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

EXTINGUISHING MEDIA

Carbon Dioxide, Dry Chemical, Foam

UNUSUAL FIRE AND EXPLOSION HAZARDS

Closed containers may explode when exposed to extreme heat.

Application to hot surfaces requires special precautions.

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

SPECIAL FIRE FIGHTING PROCEDURES

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

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

SECTION 6 — ACCIDENTAL RELEASE MEASURES**STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED**

Remove all sources of ignition. Ventilate the area.

Remove with inert absorbent.

SECTION 7 — HANDLING AND STORAGE**STORAGE CATEGORY**

DOL Storage Class IB

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

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

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

Consult NFPA Code. Use approved Bonding and Grounding procedures.

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

Keep out of the reach of children.

SECTION 8 — EXPOSURE CONTROLS/PERSONAL PROTECTION**PRECAUTIONS TO BE TAKEN IN USE**

Use only with adequate ventilation.

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

Wash hands after using.

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

VENTILATION

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

RESPIRATORY PROTECTION

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

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

PROTECTIVE GLOVES

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

EYE PROTECTION

Wear safety spectacles with unperforated sideshields.

OTHER PRECAUTIONS

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

SECTION 9 — PHYSICAL AND CHEMICAL PROPERTIES

PRODUCT WEIGHT	7.84 lb/gal	939 g/l
SPECIFIC GRAVITY	0.94	
BOILING POINT	132 - 325 °F	55 - 162 °C
MELTING POINT	Not Available	
VOLATILE VOLUME	77%	
EVAPORATION RATE	Slower than ether	
VAPOR DENSITY	Heavier than air	
SOLUBILITY IN WATER	Not Available	
VOLATILE ORGANIC COMPOUNDS (VOC Theoretical - As Packaged)		
4.90 lb/gal	588 g/l	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
<i>*for Chemical Emergency ONLY (spill, leak, fire, exposure, or accident)</i>	

SECTION 2 — COMPOSITION/INFORMATION ON INGREDIENTS

% by Weight	CAS Number	Ingredient	Units	Vapor Pressure
2	108-88-3	Toluene	ACGIH TLV 20 PPM OSHA PEL 100 ppm (Skin) OSHA PEL 150 ppm (Skin) STEL	22 mm
1	100-41-4	Ethylbenzene	ACGIH TLV 20 PPM OSHA PEL 100 PPM OSHA PEL 125 PPM STEL	7.1 mm
7	1330-20-7	Xylene	ACGIH TLV 100 PPM ACGIH TLV 150 PPM STEL OSHA PEL 100 PPM OSHA PEL 150 PPM STEL	5.9 mm
2	64742-95-6	Light Aromatic Hydrocarbons	ACGIH TLV Not Available OSHA PEL Not Available	3.8 mm
2	95-63-6	1,2,4-Trimethylbenzene	ACGIH TLV 25 PPM OSHA PEL 25 PPM	2.03 mm
35	67-64-1	Acetone	ACGIH TLV 500 PPM ACGIH TLV 750 PPM STEL OSHA PEL 1000 PPM	180 mm
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 launder 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 Trimethylbenzene	1,2,4-	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.

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

EMERGENCY AND FIRST AID PROCEDURES:

INHALATION: Remove to fresh air.

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

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

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

HMIS Rating

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

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

VI. Reactivity Data

STABILITY: STABLE

Hazardous Polymerization: *will not occur*

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

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

CONDITIONS TO AVOID: Fire, burning, and welding

VII. SPILL OR LEAD PROCEDURES

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

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

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

VIII. SPECIAL PROTECTION INFORMATION

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

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

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

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

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

HYGENIC PRACTICES: See section V

IX. SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING:

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

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

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

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

X. STABILITY & REACTIVITY

Not available at this time

XI. TOXICOLOGICAL INFORMATION

No information available at this time

XII. ECOLOGICAL INFORMATION

No information available at this time.

XIII. DISPOSAL INFORMATION

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

XIV. TRANSPORTATION INFORMATION

US Department of Transportation

Proper shipping name: Aerosols Flammable
UN ID Number: UN1950

International Air Transport Association

Proper Shipping name: Aerosols, Flammable
Hazardous Class: 2.1
UN ID Number: UN1950

International Maritime Organization

Proper Shipping name: Aerosols, Flammable
Hazardous Class: 2
UN ID Number: UN1950

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

Material Safety Data Sheet

1. MATERIAL AND COMPANY IDENTIFICATION

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

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

SDS Request : 877-276-7285

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

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

3. HAZARDS IDENTIFICATION

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

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

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

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

Eye Contact : May cause slight irritation to eyes.

Ingestion : Low toxicity if swallowed.

Other Information : Used oil may contain harmful impurities.

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

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

Environmental Hazards : Not classified as dangerous for the environment.

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

4. FIRST AID MEASURES

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

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

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

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

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

Advice to Physician : Treat symptomatically.

5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

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

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

Flammability or Explosion limits

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

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

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

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

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

6. ACCIDENTAL RELEASE MEASURES

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

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

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

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

7. HANDLING AND STORAGE

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

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

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

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

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

Unsuitable Materials : PVC.

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

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational Exposure Limits

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

Biological Exposure Index (BEI)

No biological limit allocated.

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

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

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

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

10. STABILITY AND REACTIVITY Stability

: Stable.

Conditions to Avoid : Extremes of temperature and direct sunlight.

Materials to Avoid : Strong oxidizing agents.

Hazardous Decomposition : Hazardous decomposition products are not expected to form

Material Safety Data Sheet

Products during normal storage.

11. TOXICOLOGICAL INFORMATION

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

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

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

12. ECOLOGICAL INFORMATION

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

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

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

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

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORT INFORMATION

US Department of Transportation Classification (49CFR)

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

IMDG

This material is not classified as dangerous under IMDG regulations.

IATA (Country variations may apply)

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

15. REGULATORY INFORMATION

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

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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
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MATERIAL SAFETY DATA SHEET

SECTION 1	PRODUCT AND COMPANY IDENTIFICATION
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PRODUCT

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

COMPANY IDENTIFICATION

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

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

SECTION 2	COMPOSITION / INFORMATION ON INGREDIENTS
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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	1 - 2.5%

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

SECTION 3	HAZARDS IDENTIFICATION
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This material is not considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

POTENTIAL HEALTH EFFECTS

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.

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SECTION 4 FIRST AID MEASURES

INHALATION

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

SKIN CONTACT

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

EYE CONTACT

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

INGESTION

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

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

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

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING

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

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

FLAMMABILITY PROPERTIES

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

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

Autoignition Temperature: N/D

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

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

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PROTECTIVE MEASURES

Avoid contact with spilled material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders.

For emergency responders: Respiratory protection: respiratory protection will be necessary only in special cases, e.g., formation of mists. Half-face or full-face respirator with filter(s) for dust/organic vapor or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of spill and potential level of exposure. If the exposure cannot be completely characterized or an oxygen deficient atmosphere is possible or anticipated, SCBA is recommended. Work gloves that are resistant to hydrocarbons are recommended. Gloves made of polyvinyl acetate (PVA) are not water-resistant and are not suitable for emergency use. Chemical goggles are recommended if splashes or contact with eyes is possible. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic material is recommended.

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

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 unlabelled containers.

SECTION 8

EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMIT VALUES

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

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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.

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

Comply with applicable environmental regulations limiting discharge to air, water and soil. Protect the environment by applying appropriate control measures to prevent or limit emissions.

SECTION 9

PHYSICAL AND CHEMICAL PROPERTIES

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

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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]: >204°C (400°F) [EST. FOR OIL, ASTM D-92 (COC)]
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
Autoignition Temperature: N/D
Boiling Point / Range: > 316°C (600°F) [Estimated]
Vapor Density (Air = 1): N/D
Vapor Pressure: < 0.013 kPa (0.1 mm Hg) at 20 °C [Estimated]
Evaporation Rate (n-butyl acetate = 1): N/D
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): > 3.5 [Estimated]
Solubility in Water: Negligible
Viscosity: 220 cSt (220 mm²/sec) at 40 °C | >16 cSt (16 mm²/sec) at 100°C
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: N/D
Melting Point: >260°C (500°F)
DMSO Extract (mineral oil only), IP-346: < 3 %wt
Decomposition Temperature: N/D

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

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

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

MATERIALS TO AVOID: Strong oxidizers

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

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks
Inhalation	
Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Irritation: No end point data for material.	Negligible hazard at ambient/normal handling temperatures. Based on assessment of the components.

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Ingestion	
Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Skin	
Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Irritation: No end point data for material.	Negligible irritation to skin at ambient temperatures. Based on assessment of the components.
Eye	
Irritation: No end point data for material.	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.

Middle distillates: Carcinogenic in animal tests. Lifetime skin painting tests produced tumors, but the mechanism is due to repeated cycles of skin damage and restorative hyperplasia. This mechanism is considered unlikely in humans where such prolonged skin irritation would not be tolerated. Did not cause mutations In Vitro. Inhalation of vapors did not result in reproductive or developmental effects in laboratory animals. Inhalation of high concentrations in animals resulted in respiratory tract irritation, lung changes and some reduction in lung function. Non-sensitizing in test animals.

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

--REGULATORY LISTS SEARCHED--

1 = NTP CARC

2 = NTP SUS

3 = IARC 1

4 = IARC 2A

5 = IARC 2B

6 = OSHA CARC

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

ECOTOXICITY

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

MOBILITY

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

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Base oil component -- Expected to be inherently biodegradable

BIOACCUMULATION POTENTIAL

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

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

DISPOSAL RECOMMENDATIONS

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

REGULATORY DISPOSAL INFORMATION

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

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

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Complies with the following national/regional chemical inventory requirements: AICS, ENCS, IECSC, PICCS, TSCA

Special Cases:

Inventory	Status
KECI	Restrictions Apply
NDSL	Restrictions Apply

EPCRA SECTION 302: 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	1 - 2.5%

The following ingredients are cited on the lists below:

Chemical Name	CAS Number	List Citations
NAPHTHENIC ACIDS, ZINC SALTS	12001-85-3	15
PHOSPHORODITHOIC ACID, O,O-DI C1-14-ALKYL ESTERS, ZINC SALTS (2:1) (ZDDP)	68649-42-3	13, 15, 17, 19
ZINC NEODECANOATE	27253-29-8	15

--REGULATORY LISTS SEARCHED--

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

Code key: CARC=Carcinogen; REPRO=Reproductive

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

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:

Revision Changes:

Section 06: Protective Measures was added.

Section 09: Vapor Pressure was added.

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Section 06: Accidental Release - Protective Measures - Header was added.
Section 13: Disposal Recommendations - Note was modified.
Section 09: Phys/Chem Properties Note was modified.
Section 09: Boiling Point C(F) was modified.
Section 09: n-Octanol/Water Partition Coefficient was modified.
Section 08: Comply with applicable regulations phrase was modified.
Section 08: Personal Protection was modified.
Section 09: Vapor Pressure was modified.
Section 07: Handling and Storage - Handling was modified.
Hazard Identification: Health Hazards was modified.
Section 11: Dermal Lethality Test Data was modified.
Section 11: Dermal Lethality Test Comment was modified.
Section 11: Oral Lethality Test Data was modified.
Section 11: Inhalation Lethality Test Data was modified.
Section 11: Dermal Irritation Test Data was modified.
Section 11: Eye Irritation Test Data was modified.
Section 11: Oral Lethality Test Comment was modified.
Section 11: Inhalation Irritation Test Data was modified.
Section 06: Accidental Release - Spill Management - Water was modified.
Section 09: Relative Density - Header was modified.
Section 09: Flash Point C(F) was modified.
Section 09: Viscosity was modified.
Section 09: Viscosity was modified.
Section 14: Sea (IMDG) - Header was modified.
Section 14: Air (IATA) - Header was modified.
Section 14: LAND (TDG) - Header was modified.
Section 14: LAND (DOT) - Header was modified.
Composition: Component table was modified.
Section 15: List Citations Table was modified.
Section 15: List Citation Table - Header was modified.
Section 14: LAND (DOT) - Default was modified.
Section 14: LAND (TDG) Default was modified.
Section 14: Sea (IMDG) - Default was modified.
Section 14: Air (IATA) - Default was modified.
Section 15: National Chemical Inventory Listing - Header was modified.
Section 15: SARA (313) TOXIC RELEASE INVENTORY - Table was modified.
Section 15: National Chemical Inventory Listing was modified.
Section 15: Community RTK - Header was modified.
Section 11: Additional Health Information was modified.
Section 08: Exposure limits/standards was modified.
Section 09: Melting Point C(F) was modified.
Section 15: OSHA Hazard Communication Standard was modified.
Section 15: Special Cases Table was modified.
Hazard Identification: OSHA - May be Hazardous Statement was modified.
Section 11: Chronic Tox - Component was modified.
Section 09: Decomposition Temperature was added.
Section 09: Decomposition Temp - Header was added.
Section 09: Oxidizing Properties was modified.
Section 01: Company Contact Methods Sorted by Priority was modified.
Section 10 Stability and Reactivity - Header was modified.

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