

## GENERAL PRODUCT SAFETY GUIDELINE

It is critical when handling and placing pressure containing/controlling products into service that personnel handling and installing the products be trained in proper handling practices and safe handling measures. Maintenance and monitoring of product is critical.

The information contained in this document is given in good faith, and is not intended to replace customer safety policies and practices.

**Fail-Safe:** Pressure containing products such as, but not limited to, swivels, fittings, couplings, hoses, pup joints, valves, etc., may fail without warning for many reasons. Design all systems and equipment where Best Flow Line Equipment, L.P. (BFL) products are integrated, or placed in service or pressure related applications in a fail-safe mode, so that failure of the product or product assembly will not endanger persons or property.

**Distribution:** Provide a copy of this safety guideline to all personnel responsible for selecting, using or design integration of BFL products.

**User Responsibility:** Due to the wide variety of operating conditions and uses for BFL products and accessories, BFL and its distributors do not represent or warrant that any particular BFL product is suitable for any specific end use system. Most BFL products are designed and qualified to industry regulated standards. This safety guideline does not analyze all technical parameters that must be considered in selecting a product. The user, through analysis, design and testing, is solely responsible for:

- Making final selection of appropriate product for application
- Assuring that the user's requirements are met and that the product use presents no health or safety hazards
- Providing all health and safety warnings on the equipment on which the BFL products are used



**WARNING:** Improper selection, improper use, and/or failure of swivels, fittings, couplings, hoses, pup joints, valves, or related assemblies or accessories can cause death, personal injury and property damage. Possible consequences of improper selection, improper use and/or failure of swivels, fittings, couplings, hoses, pup joints, valves, or related assemblies or accessories include but are not limited to:

- Catastrophic failure, explosion or burning of the conveyed fluid
- Contact with conveyed fluids, hot, cold, toxic, injurious
- High velocity fluid discharge
- Fittings, or parts thereof, thrown off at high velocity/speed
- Injection by high fluid discharge

**Responsibility/Proper Use:** Most BFL products are pressure vessels, and are engineered and manufactured in accordance with strict regulatory guidelines. Each product has a published working pressure that must not be exceeded.

**THE RATED WORKING PRESSURE (CWP) NOT TO BE EXCEEDED DURING FIELD SERVICE OR FIELD TESTING.**

**Pre-Installation and Periodic Inspection:** Prior to installation, a careful examination of the assembly or component must be performed. All components must be checked for correct style, size, part number, and length. In addition, the assembly or component must be examined for cleanliness, obstructions, or any other visible defects. Do not use a product that has any of these conditions.

Customary Flow Line Terminology:

Standard Service: products to be used with standard well treating fluids at ambient temperatures

H<sub>2</sub>S (Sour) Service: products that are suitable to serve in an environment where H<sub>2</sub>S may be present in a fluid or gaseous state.

Severe Service: products that are used with gaseous energized fluids (i.e. CO<sub>2</sub>, N<sub>2</sub>) and products that are used when fluid temperatures are below 0°C/32°F or colder. These product materials require special Charpy Impact Testing due to brittleness inherent in cold metal. Consult factory when temperatures for cold service or severe service products could fall below -20°F, or above 230°F for application review and approval.

\*Note – Consult BFL for any service application not covered in this Safety Guideline. Product exposed to any type of application or service not specifically addressed in this Safety Guideline should be submitted to BFL for Engineering Department review.



**WARNING: MISUSE, SIDE LOADING, IMPROPER MAINTENANCE, OR DISASSEMBLY UNDER PRESSURE CAN CAUSE SERIOUS INJURY OR DEATH**

#### **Basic Recommendations:**

BFL products covered in this Safety Guideline should be segregated and clearly identified by application. BFL recommends the following practices:

All energized fluids and gases such as CO<sub>2</sub> and N<sub>2</sub>, are to be contained by a designated string of treating/flow iron. This string must be clearly identified and must not be used for any other purpose. Pipe threaded components should never be used for energized service. Only integral union style components should be used.

Acids and standard well fluids are to have a designated string and should not be used for any other purpose.

H<sub>2</sub>S treating/flow strings must also have a designated identification and always be used when H<sub>2</sub>S is present or could be encountered. Pipe threaded components should never be used for H<sub>2</sub>S Service. Only integral union type components, designed for this service should be used.

Low Temperature treating/flow iron are to have a designated identification and always be used when ambient temperatures or fluid temperatures below 0°C/32°F are encountered. These strings/flow iron must also be segregated for type of service, such as acids, standard well fluids, and energized fluid, and gases such as CO<sub>2</sub> and N<sub>2</sub>.

Once a product has been placed in designated service application, it should remain in that service application.

All strings/flow iron should have a designated service application. A method of identifying each service string should be devised. Banding with pertinent information engraved on the band is recommended. Color coding with strict controls can be used. Using factory color coding is not recommended as some components have the same appearance and in many cases will interchange.

These service strings/flow iron should be coded in such a way to be clearly identifiable, and all personnel must be thoroughly trained in the use of these products.

External forces and mechanical loads can significantly reduce product life or cause failure. Mechanical loads include but are not limited to excessive tensile, flexing, twisting, kinking, compression, side loads, and vibration. Use of additional swivel type products or assemblies may be required to insure that no connection is placed in a bind. Unusual applications may require special testing prior to string/assembly selection.

Each string should be pressurized to its maximum planned working pressure for each application prior to each use. The maximum working pressure of the lowest rate component/end connection must not be exceeded. All personnel must be at a safe distance or position when pressure is applied.

Pressure seal threads (line pipe/LPT) are not recommended for pulsating service conditions above 10,000 PSI or where side loading or erosion are suspected. Non-pressure seal threads (NPST/round tubing) or straight integral connections are recommended under these conditions. In order to achieve the recommended Non-Shock Cold Working Pressure, a power-tight make-up is required on threaded connection. Consult the factory for any usage other than normal constant flow working conditions.

Personnel must not be around pressure vessel products while pressure is present or being applied.

Each string, as well as each component, must have regular intervals of maintenance and inspection for safe, proper performance. These intervals should never exceed 6 months, and is recommended more frequently depending on severity of service conditions. Inspection and maintenance should be recorded.

Flow rates above 42 feet per second are not recommended. Rate above 42 feet per second will cause accelerated wear. Certain abrasive media can also cause accelerated wear. Inspect at pre-determined intervals.

Welding, brazing, or heating on BFL components is prohibited.

Never mix or assemble components, parts, or end connections with different pressure ratings. Mismatched conditions, including but not limited to that of a 2" Figure 1502 male sub end connected to a 2" Figure 602 female sub, may fail under pressure resulting in death, serious personal injury, or severe property damage.

Never use or substitute non BFL components or parts in BFL products or assemblies.

Never modify or repair BFL products in a manner not specifically directed in instructions published by BFL.

Never strike, tighten, loosen, or attempt repairs on pressurized components or connections.

Complete and proper make-up of components and connections is required to attain rated working pressure. Always apply essential care, attention, handling and inspection to threaded components before, during and after make-up.

Never use severely worn, eroded, or corroded products. Contact BFL for more information on how to identify the limits of erosion and corrosion.

Never strike wing union nuts having severely flattened or extruded ears. This condition can result in flying debris leading to serious personal injury and must immediately be addressed by either grinding off extruded material or removing the nut from service.

Always follow safe practices when using products in overhead application. Products not properly secured could fall.

Never exceed the load rating of lifting devices on products or lifting equipment.

Use of BFL products in suspension applications can result in over-stress conditions leading to catastrophic failure.

Always make certain that personnel and facilities are protected from residual hazardous fluids before disassembly of any product.

Whenever leakage is detected from BFL products, remove them from service immediately to prevent death, serious personal injury, and/or property damage.

## Safety Instructions:

The application and intended service of BFL products are for working environments and systems which are properly engineered, designed and controlled. Safety policy, procedure and practice MUST be clearly established and implemented by the user(s). Always use appropriate protective equipment.

## Swivel Joints and Steel Hose Loops

BFL manufactured swivel joints and related products (hose loops) are not designed or recommended for services requiring continuous rotary motion.

### General:

When using these assemblies, safety glasses, approved safety shoes, and hard hat must be used. Hammering and lifting these assemblies must be done with caution. Where unions are present, read and understand the BFL General Safety Guideline.

Personnel should only hammer on make-up lugs, and not strike the body of wing nut or swivel components. Fractures can occur from repeated misuse. Excessive hammering can damage components.

Do not lift any swivel or other assembled product that weighs in excess of 40 lbs. Use a lifting device if assemblies are to be used above head or when weight exceed 40 lbs. Proper lifting technique should be used when lifting. Back lifts should be avoided.

It is a personal responsibility to be knowledgeable and trained in the use and handling of these products.

Storage and transportation of swivel joints should be done in a safe manner. Do not transport any assembly that may become dislodged and cause an accident.

Swivel union ends should be clean and lightly oiled prior to each use. A visual inspection for damage should also be performed at this time. Union seals should be checked and replaced when worn or damaged or exposed to atmosphere for extended periods of time.

Each swivel has a size and pressure code designated on the assembly. Use this code for proper mating and pressure limits.



## **SWIVELS AND HOSE LOOPS MAY BE RE-PAINTED FOR VARIOUS APPLICATIONS, DO NOT USE FACTORY COLOR AS A PRIMARY MEANS OF IDENTIFICATION OR DETERMINATION OF SERVICE TYPE**

Threaded end swivels/hose loops should not be used for H<sub>2</sub>S service. Only integral type swivels/hose loops should be used when sour gas is present. These must be swivels specially designed and designated for use with H<sub>2</sub>S service.

Swivels and hose loops require maintenance. Swivel sections must be greased and free to rotate without binding. Any swivel that is excessively hard to rotate while making up or breaking down should be repaired before use. Swivel(s) that leak at low or high pressure should be repaired or replaced. Extra grease is not required during rebuild assembly. Grease gun pressures can dislodge the seals from their proper locations. Field greasing should only be performed when service conditions have deteriorated the smooth positional rotation of the swivel. Any fluid leakage detection should immediately require the removal of the swivel from service for re-build. Failure to expeditiously re-build may allow retained fluids to corrode swivel ball races, and make the joint unsalvageable. Adding more grease will not stop the swivel from leaking.

Swivels and hose loops are designed for ease of hook-up and minimal line movement. Using BFL swivels for continuous rotation under pressure is strictly prohibited. Swivels are not designed for continuous rotation, even at very low pressure.

Swivel sections and hose loops must not be pressured beyond their rated working pressure in field service or field testing.

Swivels and hose loops are not designed for side-loading. Loading that will induce a bending moment into the ball races is prohibited. The swivel must be oriented to provide the required flexibility in each plane of motion and axis of rotation.

**WARNING: THE STYLES AND ORIENTATION OF SWIVELS DETERMINE THE DEGREES OF FREEDOM AND EXTENT OF RELATIVE MOTION POSSIBLE. INCORRECT PLACEMENT AND SUBSEQUENT CONSTRAINT CAN CAUSE BEARING FAILURE.**

Do not suspend loads with a swivel joint(s).

Always make sure that hook-up (make-up) is done in such a manner to insure that threaded connections do not unscrew during operation.

Monitor the condition of swivels and hose loops used in an area where permanent hook-up is required. Frame flexing or structure movements must not result in an improper side loaded condition.

Do not hammer or tamper with any BFL swivel or hose loop connection when pressure is present.

It is recommended that a rate in excess of 42 feet per second be avoided. Rates above this will cause a more rapid wear and erosion.

Always flush swivel and hose loops with water, and then a rust preventative after each use.

#### **Precautions:**

Welding, brazing, or heating swivels or hose loops is prohibited. Material damage will occur.

**Do not restrain free movement of BFL swivels or hose loops. Damage may occur, which could result in injury or death.**

If swivels or hose loops are used in acid services, they should be washed with fresh water as soon as possible. After washing, it is recommended to be submerged in rust preventative or light oil for 5 minutes.

Never alternate the service type of a swivel or hose loop. Acid service should never be followed by cold temperature service. When acid etching or erosion is present, replace the product.

When installing union end swivels or hose loops, proper mating is required. Each integral union connection is clearly marked with a pressure code (i.e. "1502" 15,000 PSI). This pressure must not be exceeded. This code should also be used with mating unions. Improper mating can result in failures. All integral union connections used must match (according to size, pressure rating, etc.). These connections must also match the service of the designated string they are installed in.

#### **Inspection/Repair/Testing:**

Ultrasonic (Wall Thickness) testing should be performed at a minimum of once every year on the designated sections of the components from the BFL Minimum Wall Guideline. Inspection should be done with increased frequency (3 to 6 months) dependent on service conditions, and the presence of sand or caustic laden flow material. Any product with wall loss exceeding minimum should be replaced. Visually inspect prior to each use and verify that swivels rotate smoothly and are greased properly, and that exposed packing/elastomers are in optimal condition.

Swivels should be thoroughly inspected, serviced, and/or repaired, at least every 6 months. While assembly is torn down, a visual inspection for wear, corrosion, or erosion should be performed. In areas of high use, this type of inspection should be more frequent. Always visually inspect prior to each use.

If the swivel leaks, it should be removed from service for immediate repair or replacement. Fluids may leak into the ball race cavity. This area is highly susceptible to problems caused by caustic or acid type fluids. If the ball races show indications of acid contamination, replace the unit.

Use only BFL repair kits when repairing and rebuilding units.

Only water, at ambient temperature should be used during pressure testing. Personnel should wear proper safety equipment and avoid any area of danger while pressure is present. Prior to any pressure testing, all air must be evacuated from the system. Failure to do so could result in PERSONAL INJURY OR DEATH!!

Weld repair is prohibited for swivels and hose loops.



**THE RATED WORKING PRESSURE IS NOT TO BE EXCEEDED DURING FIELD SERVICE OR FIELD TESTING.**

### Pressures and Temperature Ratings:

Standard service long radius swivel joints are designed for service up to 15,000 PSI non-shock cold working pressure. Nameplates (tags) and union nuts display the designated pressure ratings. Since nameplates are the primary means of identifying pressure rating of products, they must not be removed, painted or otherwise made unreadable.

The service and working pressure for any new swivel are also designated by the factory color. Examples of this are:

Service	Color	Max. Pressure	Max. Temp	Ideal Range
Standard (Std.)	Red	15,000 psi (1034 bar)	250°F / 121°C	- 30°F to 212°F
H2S (Sour Gas)	Safety Green	10,000 psi (690 bar)	482°F / 250°C	- 15°F to 400°F

BFL does not have official data on the life expectancy of seals outside of the ideal temp range, operating in these temperatures will result in brittle seals for temperatures below stated minimum, and lowered hardness for temperatures higher than stated maximum. For exposure to lower temperatures, expect shrinkage, which may result in premature leaks from the equipment. For exposure to higher temperatures, expect permanent deformation along with lowered durometer that may result in premature leaks from the equipment. Service life of all equipment, including packing/elastomers will depend on type and severity of service.



**SWIVELS AND HOSE LOOPS MAY BE RE-PAINTED FOR VARIOUS APPLICATIONS, DO NOT USE FACTORY COLOR AS A PRIMARY MEANS OF IDENTIFICATION OR DETERMINATION OF SERVICE TYPE**

### Unions and Union End Products

#### General:

Each union has a size and pressure code designated on the wing nut, and/or union sub-component. Use this code for proper mating and pressure limits.

Unions should be properly cleaned and lightly oiled before using. Union seals should be visually examined prior to make-up, and replaced if worn, torn, or cracked.

Unions and treating pipe will withstand some minor misalignment, however, placing piping where side loads are present is extremely dangerous and must be avoided.

Treating pipe should not be used to vent gaseous fluids or gas to the atmosphere. Line whip can occur, potentially causing property damage, personal injury or death.

Any union or treating pipe section that has been pressurized beyond its specified working pressure must be replaced.

Do not hammer on, or be around union assemblies when pressure is present.

It is recommended that a rate in excess of 42 feet per second be avoided. Rates above this will cause a more rapid wear and erosion.

#### **Precautions:**

Welding, brazing or heating unions or treating pipe is prohibited. Only butt weld unions and connections may be welded, and only then in accordance with specific and approved processes.

Any BFL union that is assembled to a crossover sub or other threaded connection will be limited to the working pressure of the lowest rated member.

All BFL threaded components are right hand threaded unless specifically designated otherwise. Any turning to the left hand, or counter clockwise will unscrew the components. Always make sure any threaded component is made up properly with the correct power torque make-up before pressure is applied.

Once a product has been placed in a designated service, it should remain in that service application for the life of the product.

All products should be properly cleaned followed by an application of a rust preventative, grease or oil after each use, and inspected prior to each subsequent use.

Pressure seal threads (line pipe/LPT) are not recommended for pulsating service above 10,000 PSI or where side loading or erosion is suspected. Non-pressure seal threads (round tubing/NPST) or straight integral connections are recommended under these service conditions. In order to achieve the recommended Non-Shock Cold Working Pressure, power-tight make-up is required on threaded connections. Consult the factory for any usage other than normal constant flow working conditions.

Each integral union connection is clearly marked with a pressure code (e.g. – “1502”/15,000 PSI). This pressure must not be exceeded. This code should also be used with mating unions. Improper mating can result in failures. All integral union connections must match according to both size and pressure rating. These connections must also match the service of the designated string they are installed in.

The internal diameter threads of pressure seal (line pipe/LPT) and non-pressure seal (round tubing/NPST) products are different. Do not attempt to mate these types. Failure will occur.

#### **Inspection/Repair/Testing:**

Unions should be inspected each time they are used. Any dents in the wing nut or union half caused by misdirected hammer blows should be ultrasonically checked or replaced before each use. Rolled or worn threads are unsafe and should be replaced. Unions with damaged or worn ears or lugs should be repaired or replaced.

Unions showing signs of internal washing, corrosion, acid pitting or rust should be replaced.

Strings, treating lines and equipment should have Ultrasonic (Wall Thickness) testing performed at a minimum of twice a year on the designated sections of the components from the BFL Minimum Wall Guideline. Inspection should be done with increased frequency (3 to 6 months) dependent on service conditions. Any product with wall loss exceeding minimum should be replaced.

BFL also recommends that routine hydrostatic pressure tests be performed on the hammer unions and treating pipe.

Only water, at ambient temperature should be used during pressure testing. Personnel should wear proper safety equipment and avoid any area of danger while pressure is present. Prior to any pressure testing, all air must be evacuated from the system. Failure to do so could result in PERSONAL INJURY OR DEATH!!

Weld repair is prohibited for unions.



**THE RATED WORKING PRESSURE IS NOT TO BE EXCEEDED DURING FIELD SERVICE OR FIELD TESTING.**



**WARNING: MISUSE, SIDE LOADING, IMPROPER MAINTENANCE, OR DISASSEMBLY UNDER PRESSURE CAN CAUSE SERIOUS INJURY OR DEATH**

### Plug Valves

#### General:

When using these assemblies, safety glasses, approved safety shoes, and hard hat must be used. Hammering and lifting these assemblies must be done with caution. Where unions are present, read and understand the BFL General Safety Guideline.

Personnel should only hammer on make-up lugs, and not strike union nut or valve body. Fractures can occur from repeated misuse. Excessive hammering can damage components.

Do not lift any plug valve or other assembled product that weighs in excess of 40 lbs. Use a lifting device if assemblies are to be used above head or when weight exceed 40 lbs. Proper lifting technique should be used when lifting. Back lifts should be avoided.

Do not hammer on, or be around valve assemblies when pressure is present.

Hand actuation (with appropriate actuator bar) should be only be done by specially trained personnel under direct supervisory instruction; and only when necessary due to application.



**WARNING: DO NOT ATTEMPT TO OPEN/CLOSE ANY OF THE VALVES/COMPONENTS DURING OPERATION**

**SWIVELS, HOSE LOOPS AND PLUG VALVES MAY BE RE-PAINTED FOR VARIOUS APPLICATIONS, DO NOT USE FACTORY COLOR AS A PRIMARY MEANS OF IDENTIFICATION OR DETERMINATION OF SERVICE TYPE**



## Precautions:

Proper transportation of BFL plug valves is important. Racks that will secure valves and prevent accidental unloading are critical. Never transport any BFL product in a fashion that would allow it to become dislodged and cause an accident.

Valve unions should be clean and lightly oiled prior to each use. A visual inspection for damage should also be performed at this time. Union seals should be checked, and replaced when worn or damaged.

Each valve has a size and pressure code designated on the valve. Use this code for proper mating and pressure limits.

Valve usage should be monitored by a qualified supervisor or foreman. Supervisory personnel must approve proper placement, position, and handling of all plug valves in the system. Only specially trained personnel under direct supervisory instruction, should actuate valves under pressure. Remote valve operation is preferable and recommended.

Prior to applying pressure, valves should be greased in both the opened and closed position. This should be done before each use. If valve is excessively hard to operate, it should be removed and not used until repairs are made.

It is sometimes necessary to turn valves when pressure is present. It is recommended that remote control actuators be used for this purpose. If this is not feasible, then only experienced specially trained personnel under direct supervisory instruction should perform this task.

Venting flammable or explosive gases to the atmosphere through individual BFL plug valves must be avoided. Choke manifolds should be used for this purpose, and the choke manifolds must be anchored if used for bleeding. BFL recommends that remote controlled valves be used for these applications.

**WARNING: GASES, OR FLUIDS CONTAINING GASES, WILL CAUSE VALVES TO WHIP AND CAN CAUSE SERIOUS INJURY OR DEATH!**

When opening a BFL plug valve under pressure, the initial torque to start the stem turning is always greater than the moving torque. You must position your body to be able to compensate for this change.

Do not position any part of your body in the path of exit flow of the plug valve.

Do not position the exit of any plug valve, used for bleeding, where rocks or debris may be picked up by the exit stream.

If any valve becomes plugged, or does not operate properly, contact a supervisor immediately. DO NOT look into the end of the valve to check for debris, blockage, or for any other reason.

If valve is slow to open or close, remove it from service. Do not hammer on the valve's actuator cap.

It is recommended that a rate in excess of 42 feet per second be avoided. Rates above this will cause a more rapid wear and erosion.

Flush clean and grease after each job with water and the proper BFL recommended grease. Use only a pressure rated gun for greasing application.

Welding, brazing, or heating BFL plug valves is prohibited.

Valve operation sometimes require personnel to be around pressured lines. Only experienced personnel should be dispatched for this purpose. Exposure time should be at a minimum. Always use remote controlled valves whenever possible. Never look into or position yourself in, the path of the exit flow of the valve.

Never alternate a valve's service. Acid service should never be followed by cold temperature service. When acid etching or erosion is present, replace the valve.

Each integral union connection is clearly marked with a pressure code (e.g. – “1502”/15,000 PSI). This pressure must not be exceeded. This code should also be used with mating unions. Improper mating can result in failures. All integral union connections must match according to both size and pressure rating. These connections must also match the service of the designated string they are installed in.



**THE RATED WORKING PRESSURE IS NOT TO BE EXCEEDED DURING FIELD SERVICE OR FIELD TESTING.**

**Pressures and Temperature Ratings:**

Standard service BFL plug valves are designed for service up to 15,000 PSI non-shock cold working pressure. Sour Gas (H<sub>2</sub>S) plug valves are designed for service up to 10,000 PSI non-shock cold working pressure.

Nameplates (tags) and union nuts display the designated pressure ratings. Since nameplates are the primary means of identifying pressure rating of products, they must not be removed, painted or otherwise made unreadable.

The service and working pressure for any new plug valve are also designated by the factory color. Examples of this are:

Service	Color	Max. Pressure	Max. Temp	Ideal Range
Standard (Std.)	Red	15,000 psi (1034 bar)	250°F / 121°C	- 30°F to 212°F
H2S (Sour Gas)	Safety Green	10,000 psi (690 bar)	482°F / 250°C	- 15°F to 400°F

BFL does not have official data on the life expectancy of seals outside of the ideal temp range, operating in these temperatures will result in brittle seals for temperatures below stated minimum, and lowered hardness for temperatures higher than stated maximum. For exposure to lower temperatures, expect shrinkage, which may result in premature leaks from the equipment. For exposure to higher temperatures, expect permanent deformation along with lowered durometer that may result in premature leaks from the equipment. Service life of all equipment, including packing/elastomers will depend on type and severity of service.

**WARNING: DISASSEMBLY UNDER PRESSURE CAN CAUSE SERIOUS INJURY OR DEATH!**

**Inspection/Repair/Testing:**

Caustic and corrosive fluids will cause deterioration of internal surfaces, including both the valve body pocket and the sealing mechanism components. Routine flushing of valves after each job will help prevent corrosion.

Valves should be greased after each use. Use only Val-tex grease and grease guns.

- Val-tex 1502 (Temp Range -20°F to 400°F) – Used during assembly only (manually applied to internal components)
- Val-tex 972 (Temp Range -20°F to 600°) – Used after assembly to inject valve with lube sealant via grease gun

\*CAUTION – Do not mix stick grease types or formulas, use only approved grease (contact manufacturer). Mixing can cause increased internal friction between valve components. See plug valve assembly/rebuild manual for complete instructions.

Proper knowledge and application of the plug valve is necessary for safe operation. It is recommended that a routine maintenance program include, but not limited to:

- Inspection of wall thickness loss
- Routine replacement of O-rings and seals
- Scheduled greasing of the plug valve after every fracturing or service job with recommended lubricants.

Any alteration of the BFL plug valve is prohibited.

Use only repair methods as outlined by BFL valve service literature.

Use only BFL repair kits when repairing and rebuilding units.

Pressure seal threads (line pipe/LPT) are not recommended for pulsating service above 10,000 PSI or where side loading or erosion is suspected. Non-pressure seal threads (round tubing/NPST) or straight integral connections are recommended under these service conditions. In order to achieve the recommended Non-Shock Cold Working Pressure, power-tight make-up is required on threaded connections. Consult the factory for any usage other than normal constant flow working conditions.

Threaded end plug valves must have the API pipe threads (pressure seal/LPT) inspected every 90 days. These threads are right hand threads. Turning counter clock wise, or to the left, will unscrew the valve. This must never be done while the valve is in service. Always make sure any threaded component is correctly made up per service standards.

BFL recommends that weld repair not be attempted on this product. Worn components shall be removed from service and replaced.

Plug valves should be fully disassembled, inspected, and pressure tested at least every 6 months and always pressure tested after each repair/rebuild. The valve should be tested in an open and closed position. Personnel should be a safe distance during pressure cycles. They should never look into, or position themselves in the exit flow path of the valve.

Pressure testing should be done with water, cold to room temperature. Personnel should wear proper safety equipment and avoid any area of danger while pressure is present. Prior to any pressure testing, all air must be evacuated from the system. Failure to do so could result in PERSONAL INJURY OR DEATH!!



**THE RATED WORKING PRESSURE IS NOT TO BE EXCEEDED DURING FIELD SERVICE OR FIELD TESTING.**