



**PLEASE READ AND UNDERSTAND THIS MANUAL BEFORE
USING SAVA PNEUMATIC PIPE PLUGS**

PNEUMATIC PIPE PLUGS

& PROTECTIVE SLEEVES

SAFETY, OPERATION AND MAINTENANCE INSTRUCTIONS



NON-COMPLIANCE WITH INSTRUCTIONS AND WARNINGS FOR SAFE OPERATION OF PNEUMATIC PLUGS CAN DAMAGE PRODUCTS, CAUSE SERIOUS BODILY INJURIES OR EVEN DEATH.

TWELVE RULES FOR SAFE OPERATION OF PNEUMATIC PLUGS

1. Stay clear of the plug when under pressure (11)
 2. Always wear protective clothing and equipment (5)
 3. Always use accurate air pressure gauges (3)
 4. Never exceed the maximum inflation pressure for the plug (8)
 5. Never exceed the maximum allowable back pressure (9)
 6. Always provide support and/or bracing to secure the plug when back pressure is present (10)
 7. Always release the back pressure first before deflating the pneumatic plug (12)
 8. Before and after each use, clean the plug and inspect for surface tears, cuts or any other damage (2)
 9. Always choose the proper size of pneumatic plugs (4)
 10. Before insertion of the pneumatic plug thoroughly clean the pipeline (6)
 11. Always correctly insert the pneumatic plug into pipeline (7)
- Always determine the backpressure that the pneumatic plug will have to resist during the application. (1)

SIX STEPS FOR USE OF PNEUMATIC PLUGS FOLLOWING THE TWELVE RULES FOR SAFE OPERATION

HOW TO CHOOSE THE CORRECT PNEUMATIC PLUG?

1. Always determine the back pressure that the plug will have to resist during use
2. Always choose the proper size of the plug by measuring the internal diameter of the pipe

HOW TO PREPARE THE PNEUMATIC PLUG AND THE PIPELINE?

1. Prior to each and every use, clean and inspect the plug for any visible surface tears, cuts or any other damage
2. Always check air line connections and hoses to make sure they are not leaking
3. Always remove dirt and debris from the pipe before inserting the plug

USE OF SAFETY DEVICES

1. Always wear protective clothing and equipment
2. Always use safety support or bracing for the plug
3. Use only properly calibrated air pressure gauges

CORRECT INSERTION OF THE PLUG INTO THE PIPE

1. Be sure that the plug is fully inserted into the pipe so that no part of it is protruding when inflated
2. At first, inflate the plug only until it touches the pipe wall. Then slowly and carefully build up the pressure up to the maximum allowable inflation pressure

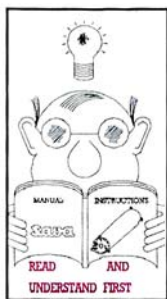
PROPER USE OF THE PLUG INSIDE THE PIPE

1. Stay clear of the pneumatic plug while inflated
2. Never exceed the maximum inflation pressure for the plug in use
3. Never exceed the maximum allowable back pressure

PROPER REMOVAL OF THE PLUG FROM THE PIPE

1. Always release the back pressure before deflating the plug
2. Do not pull on the air hose to remove the plug

INSTRUCTIONS FOR SAFE OPERATION



Instructions for safe and correct operation of Sava pneumatic plugs

WARNING!

BEFORE USE OF SAVA PNEUMATIC PLUGS, PLEASE READ THE INSTRUCTIONS VERY CAREFULLY.

THE INSTRUCTIONS APPLY TO ALL SIZES AND TYPES OF SAVA PNEUMATIC PLUGS; THE INSTRUCTIONS MUST BE MADE AVAILABLE FOR ALL USERS OF SAVA PNEUMATIC PLUGS.

Recommendations, requirements and instructions for use of Sava pneumatic plugs apply to all sizes and types of Sava pneumatic plugs.

Instructions given for construction, production and inspection of Sava products always include a high level of safety which does not only bind the manufacturer but the user as well. The user and the manufacturer shall always bear in mind safe and correct procedures when using Sava pneumatic plugs.

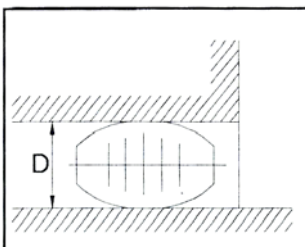
Read instructions carefully. Should you have any questions or if any extraordinary circumstances appear - not stated and described in this brochure - consult your supervisor or safety engineer or call us.

Additional copies of this brochure are always available from Sava Trade Inc - If you require additional copies or you have any question please do not hesitate to contact us (phone 386-760-0706). Or print from our online pdf library <http://www.savatrade.com/SafetyManual.pdf>

1. Always determine and consider the backpressure that the pneumatic plug will have to resist during the application

WARNING!

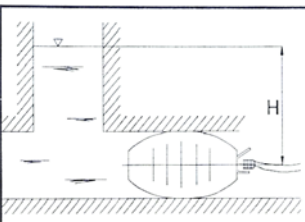
DURING USE OF THE PNEUMATIC PLUG -WHEN IT IS INSERTED IN A PIPELINE AND FILLED WITH AIR- POWERFUL FORCES MAY EMERGE IN, AROUND AND BEHIND THE PLUG. THE TOTAL FORCE EXERTED ON THE PNEUMATIC PLUG IS PROPORTIONAL TO THE PRESSURE MULTIPLIED BY THE AREA OF THE PIPELINE OPENING. BACKPRESSURE LEVELS FOR INDIVIDUAL SAVA PNEUMATIC PLUGS ARE GIVEN IN GRAPH FORM BELOW AND CAN BE COMPUTED USING THE FOLLOWING FORMULAS.



1. Measure the inner diameter D (mm) or (in) of the pipeline.

2. Calculate the surface S (mm²) or (in²) of the pipeline cross-section according to the following equation:

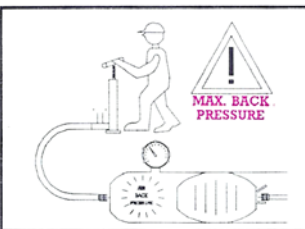
$$S = \pi R^2 \quad \text{Where } \pi = 3.1416 \text{ and } R (\text{Radius}) = \frac{D}{2}$$



3. Calculate the total force that the plug has to resist according to the following equation:

$$F = P \times S \times 0.1 \quad (F = \text{Newton})$$

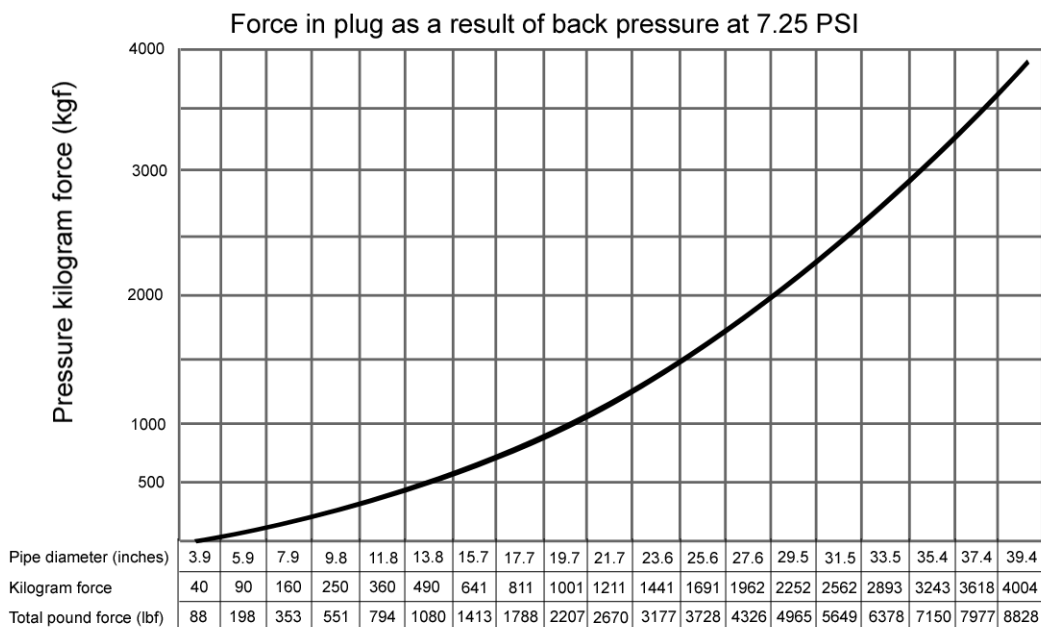
$$F = P \times S \quad (F = \text{Pound force lbf})$$

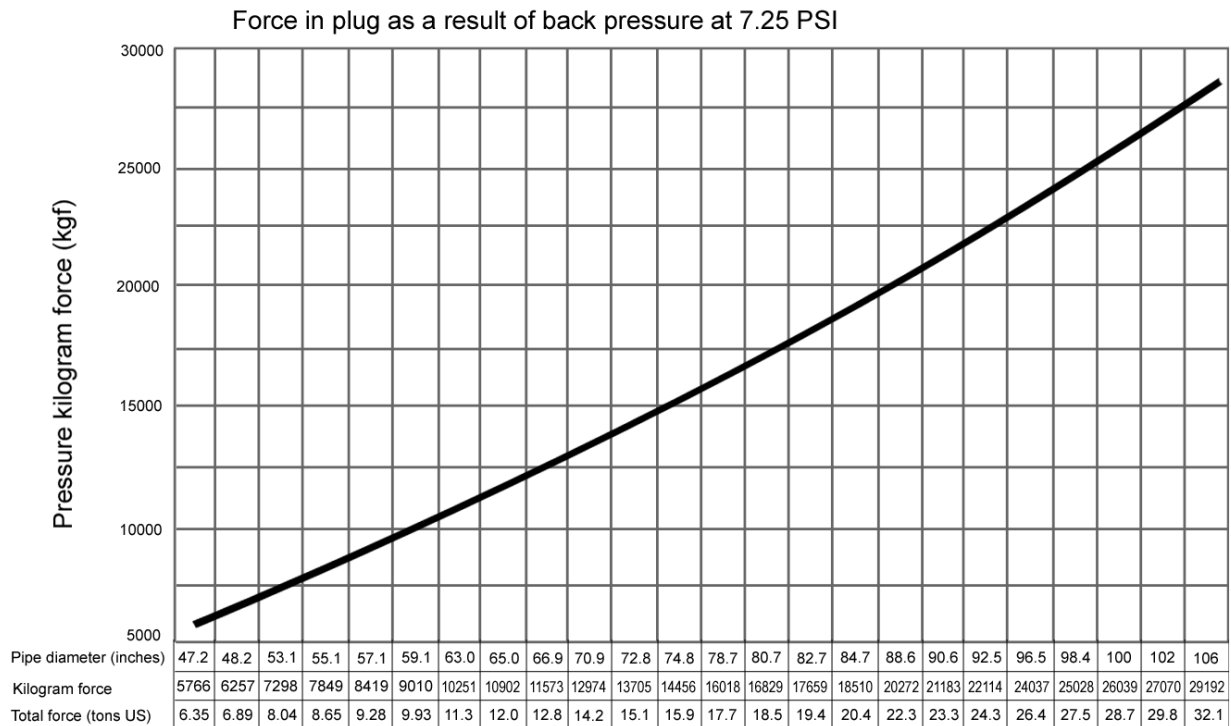


Where

S - Cross-section surface (mm²) (in²)

P - back pressure (bar) (PSI)

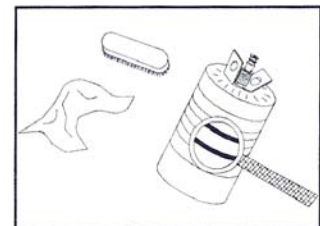




The back pressure P is defined by the water column height behind the plug, e.g. a 10 meter-high (32.8 ft) water column means a backpressure of 1 bar (14.4 PSI), the surface size and the water column shape are not important, only the height is important, Hydrostatic pressure (water column pressure) depends on the water level height above the measurement spot

Should any questions regarding the equations arise, please consult your supervisor or responsible engineer.

3. Before and after each use, clean the plug and inspect for surface tears, cuts or any other damage



Sava pneumatic plugs can be cleaned with a solution of water and detergent. After cleaning, dry the plug.

WARNING!
NEVER CLEAN WITH SOLVENTS, HYDROCARBONS OR OTHER AGGRESSIVE AGENTS; THE PLUG CAN BE DAMAGED OR EVEN DESTROYED.

Before and after use carefully check the pneumatic plug for any damages, such as cuts, blisters between rubber layers, worn out parts, damaged connections, etc.

4. Always use accurate air pressure gauges

The pneumatic plugs may only be connected and operated through a single fitting inflation controller or a comparable controller with a pressure relief valve (typically 1.5 or 2.5 bar – 22 or 36 PSI, depending on the type of plug). Always carefully check plug inflation hoses, control and safety devices, and replace them, if required. See that safety valves, pressure valves and clamps are clean which will assure undisturbed and correct plug operation.

WARNING!
IF YOU SUSPECT THAT THE PNEUMATIC PLUG OR ACCESSORIES ARE DAMAGED, CONSULT A SAVA REPRESENTATIVE AND ARRANGE TO RETURN THE PRODUCT TO BE INSPECTED TO SAVA OR SCRAP THE PRODUCT AND REPLACE IT WITH A NEW ONE. IF YOU NOTICE ANYTHING EXTRAORDINARY REMOVE THE PLUG AND ADVISE THE SUPERVISOR OR SAFETY ENGINEER.

5. Always choose the proper size of pneumatic plugs

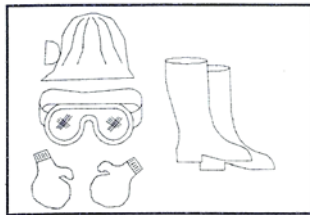
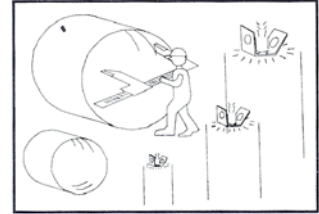
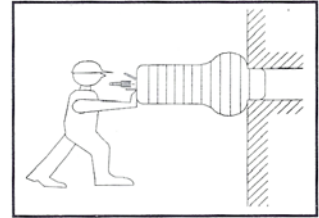
For each Sava pneumatic plug the lower and upper range of application is defined. The nominal size of the plug or the range in which it may be used is clearly marked on the plug itself.

Before using the pneumatic plug, always:

Measure the inner pipeline diameter in which the plug will be inserted
Make sure the pipeline diameter is within the range defined for the plug

WARNING!

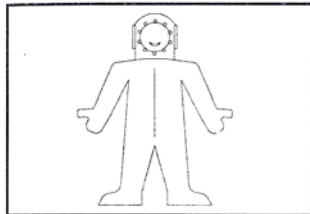
NEVER USE THE PLUG IN PIPELINES OF A LARGER OR SMALLER DIAMETER AS DEFINED FOR THE RANGE OF APPLICATION.



6. Always wear protective clothing and equipment

When handling Sava pneumatic plugs always use required protective equipment (goggles, helmet, ear plugs and clothing).

The use of protective equipment depends on the circumstances in which pneumatic plugs are used.



WARNING!

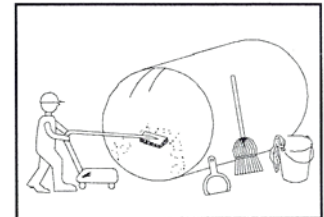
ALWAYS WEAR PROTECTIVE GOGGLES, HELMET AND GLOVES.

6. Before insertion of the pneumatic plug, thoroughly clean the pipeline

The pipeline should be properly cleaned, all sharp particles removed in order to prevent poor sealing and decrease of backpressure values as well as possible damages of pneumatic plugs. There are several ways to clean the pipe: high water pressure and cleaning with the so-called milling robots with simultaneous water injection.

WARNING!

DIRT OR SHARP PARTICLES IN THE PIPELINE CAN CAUSE POOR SEALING AND CAN CAUSE DAMAGE TO THE PNEUMATIC PLUG.

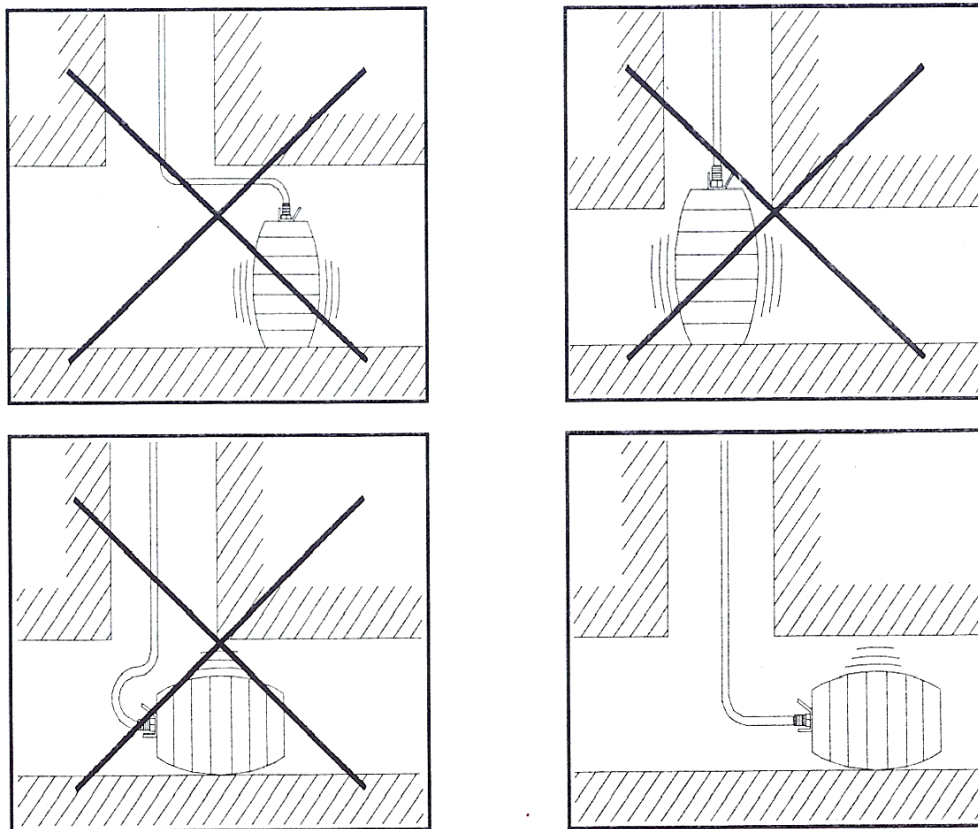


7. Always correctly insert the pneumatic plug into pipeline

Before inflating pneumatic plug with air or water, place it in the pipeline so the distance from the beginning of the pipeline to the pneumatic plug is equal the pipeline diameter. During inflation, plugs can expand in length.

DANGER

Before and during inserting pneumatic plugs follow the four basic rules:



1. NEVER INFLATE PNEUMATIC PLUGS OUTSIDE THE PIPE
2. NEVER INFLATE PNEUMATIC PLUGS IN A DIRTY PIPE OR WHEN SHARP PARTICLES ARE PRESENT
3. PNEUMATIC PLUGS MUST BE FULLY INSERTED INTO THE PIPE
4. NEVER INFLATE PNEUMATIC PLUGS UNTIL FULLY INSERTED INTO POSITION

8. Never exceed the maximum inflation pressure for the plug



Inflate the plug to the **EXACT** prescribed inflation pressure; the correct inflation pressure is clearly marked on each product. During work with plugs accurately measure and monitor the inflation and backpressure values.

Pneumatic plugs are designed for temporary pipeline blocking which is why it is required to check the pressure at least every 5 hours.

WARNING!

ALWAYS USE ACCURATELY CALIBRATED GAUGES. EXCEEDING PRESCRIBED INFLATION PRESSURE CAN DAMAGE OR EVEN DESTROY THE PLUG. UNDERINFLATED PLUGS CAN SLIP OUT OF THE PIPELINE.

NOTE: The prescribed inflation pressure is both the maximum as well as the minimum inflation pressure. It is the only inflation pressure at which the pneumatic plug will hold the maximum allowable backpressure.

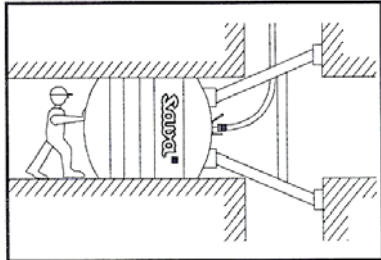
9. Never exceed the maximum allowable backpressure

Maximum backpressures are defined for those Sava pneumatic plugs, which are inserted into clean and dry pipes. Dirt in pipes (algae, grease, detergents, mildew, sand etc.) can considerably decrease the backpressure values. Pipelines made of materials with lower coefficient of friction, e.g. polyethylene or new pipelines with remains of grease or slippery agents directly decrease the coefficient of friction as well as the backpressure values.

WARNING!

SHARP PROTRUSIONS IN THE PIPE CAN CAUSE PLUGS TO EXPLODE WITH TREMENDOUS FORCE. EVEN SMALL PARTICLES CAN CAUSE PLUG RUPTURE. THE PIPE MUST BE SCRAPED ABSOLUTELY CLEAN BEFORE INSERTING THE PLUG. ALL LOOSE PARTICLES MUST THEN BE REMOVED FROM THE PIPE.

10. Always provide support and/or bracing to secure the plug when backpressure is present



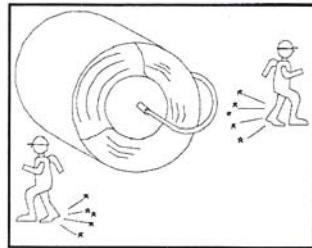
DANGER

ANCHORING OR BRACING MUST ALWAYS BE USED IN ORDER TO SAFELY PREVENT THE PLUG FROM SLIPPING. FOR AXIAL FORCES SEE DIAGRAM/TABLE ABOVE. THE WATER PRESSURE IN THE PIPE MUST NOT EXCEED FACTORY RECOMMENDED VALUES.

Never use the ring bolts or holders fitted on the plug as a safety device; they are only intended for lowering and lifting of pneumatic plugs. They are not designed to transfer powerful forces initiated by backpressures.

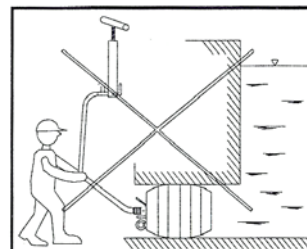
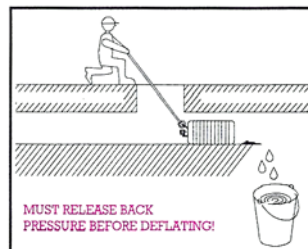
11. Stay clear of the plug when under pressure

It is dangerous to stand near a pipe or a manhole containing a pneumatic plug under pressure.



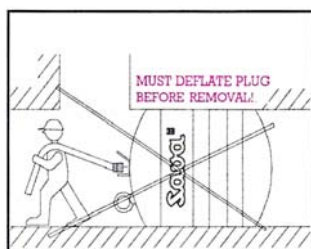
DANGER

STAY CLEAR OF THE DANGER ZONE. NOT FOLLOWING THE INSTRUCTIONS CAN RESULT IN SERIOUS INJURIES OR EVEN DEATH.



12. Always release the backpressure first before deflating the pneumatic plug

DEFLATION OF THE PLUG WHILE BACKPRESSURE IS PRESENT WILL CAUSE THE PLUG TO EJECT OUT OF THE PIPE UNDER TREMENDOUS FORCE POSSIBLY CAUSING INJURY OR DEATH

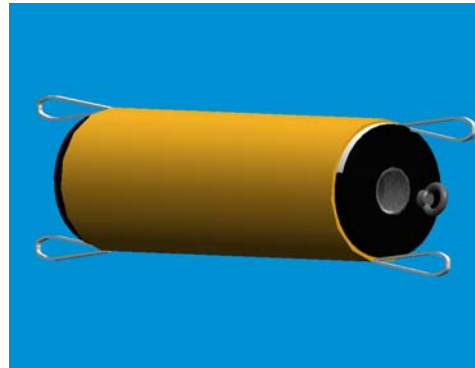


WARNING!

REMOVE THE PLUG ONLY WHEN COMPLETELY DEFLATED. NEVER REMOVE IT BY PULLING ON THE INFLATION HOSE. ALWAYS APPLY A ROPE INTO THE EYE BOLTS OR HOLDERS. USE OF THE INFLATION HOSE TO LIFT THE PLUG CAN DAMAGE THE PLUG OR THE INFLATION HOSE AND IS DANGEROUS.

Sava Trade, Inc.
413 Oak Place, Bldg. 5J-O
Port Orange, FL 32127
888-436-9778; 386-760-0706; Fax 386-760-8754

INSTRUCTIONS FOR USE OF PROTECTIVE SLEEVES



1. Prior to each use, the plug and protective sleeve must be cleaned and inspected.
2. Use the handling straps to pull the sleeve over the plug.
3. Before the first time use of protective sleeves for 350-600, 375-750, and 500-1000 plugs, we recommend placing the plugs under partial vacuum in order to facilitate the placement of sleeves. Silicon spray lubricant can be applied to the inner surface of the protective sleeve to make it easier to slide over the plug.
4. Place the sleeve evenly over the plug.
5. The sleeves are designed to fit snugly over the plug, however, we recommend to secure the straps to the eyebolts located on the plug.
6. Observe all other safety precautions applicable to safe use of pipe plugs.

888-436-9778

International or Local +386-760-0706