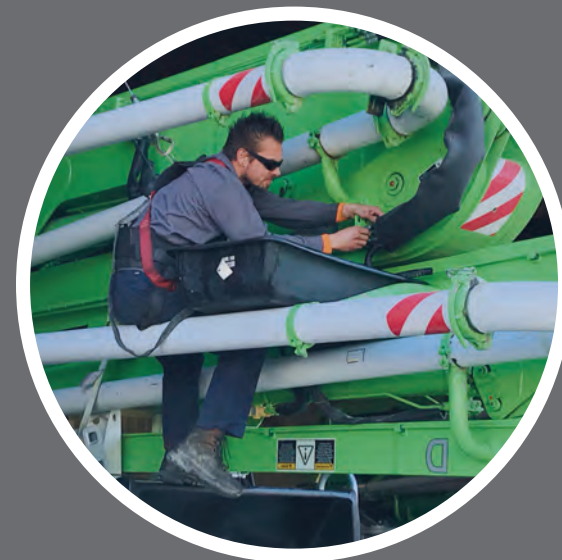


SAFETY PROCEDURES

WHEN MAINTAINING A CONCRETE PUMP



AMERICAN CONCRETE
PUMPING ASSOCIATION

WWW.CONCRETEPUMPERS.COM

SHOP MECHANICS

Operating and maintaining a concrete pump requires a serious commitment to safety and a clear strategy for the day's work.

⚠️WARNING Multiple hazards. ARRIVE ON TIME so you don't need to rush and take shortcuts. A safe and successful day begins when you arrive at work on time, rested and with a clear head.

⚠️WARNING Entanglement hazard. Be properly attired for the conditions—wear all personal protection equipment (PPE) and fall protection needed for the task. Wear snug-fitting clothing. Keep your shirt tucked in to avoid getting caught in moving machinery. Remove jewelry.

⚠️WARNING Slipping hazard. Keep the floor, pump deck, and work area free of oil and grease to prevent slipping and falling while trying to perform your duties. Clean up after every operation. Keep dirty rags in an approved fireproof container.

⚠️WARNING Falling hazard. While climbing onto or off any equipment, remember the Three-Point Rule, which is: always have one hand and two feet, or two hands and one foot in contact with a secure step or handle.

⚠️WARNING Multiple hazards. NEVER ATTEMPT TO SET UP A CONCRETE PUMP IF YOU DON'T KNOW HOW TO RUN IT! Know the proper operation of auxiliary equipment such as forklifts and air compressors. If unsure, ask your supervisor before you proceed.



NOTICE Before starting any engine, check all fluid levels, engine oil, hydraulic oil, coolant level, and if so equipped, power steering and hydraulic brake fluid. If the pump has a separate engine, also check fluid levels before starting. It is now possible to start your engines.

⚠️WARNING Amputation and entanglement hazard. Before you start the engine of a pump, be sure no one is working in a hidden area of the machine. After checking that no one is near the pump, yell “CLEAR” and allow time for response before starting it.

After starting the engine, feather the throttle but do not “rev” the engine, as this may cause permanent damage to a turbocharger or other components on the pump. Check that all on-board systems like oil and air pressures are reading normal and the electrical system is charging.

If you must drive a truck, remember the principal causes of truck accidents:

- Following too closely
- Backing up without supervision
- Turning too sharply
- Hitting something overhead

For information regarding driving the truck, unit setup, and boom operation, please refer to the Boom Pumps Section in the ACPA Operator Study Guide.

⚠️WARNING Amputation and entanglement hazard. NEVER work in a hidden area of the unit without first implementing a proper lockout/tagout procedure. At the very least, remove the key and put it in your pocket to prevent someone else from starting the unit while you are working on it.

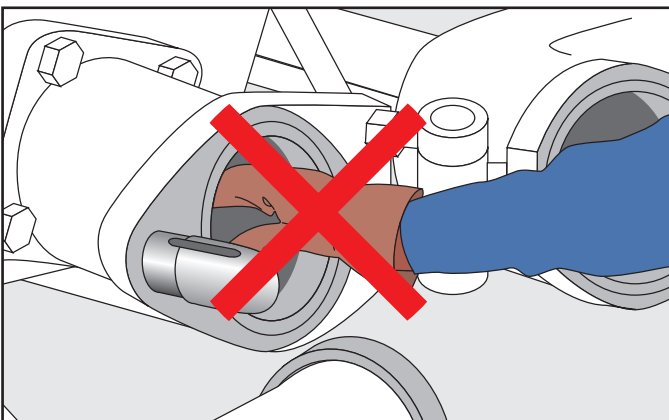
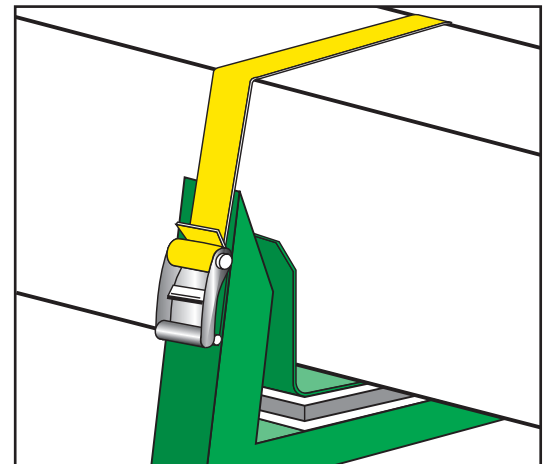




⚠️WARNING Multiple hazards. NEVER surrender the machine controls to a non-qualified individual. If you are momentarily away from the machine, make certain the hydraulic system is disabled by engaging the emergency stop switch or taking the pump out of gear.

⚠️DANGER Electrocuting hazard. If it is necessary to unfold the placing boom to do maintenance work, you must watch for overhead power lines. You must maintain a minimum clearance of 20 ft (6 m) between the power line and any part of the unit (50 ft [15 m] for lines above 350 kV).

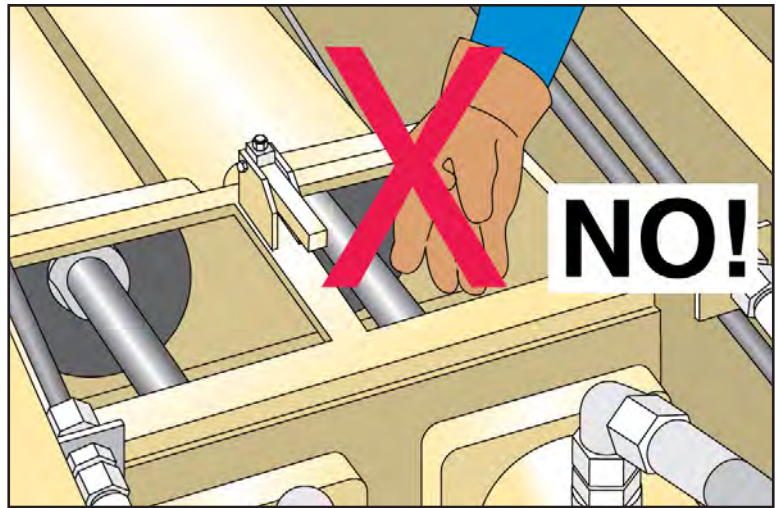
⚠️WARNING Tipping hazard. NEVER move a boom pump any distance without folding the boom and outriggers into the travel position and locking the outriggers in place. If your machine was equipped with a tie-down strap from the factory, keep it in good condition, and use it before driving on a roadway.



⚠️WARNING Crushing and amputation hazard. NEVER REACH INTO THE VALVE OR WATER BOX unless the transmission is out of gear (if applicable), or the engine is stopped, and you have verified zero pressure on the accumulator!

⚠️WARNING Crushing and amputation hazard.

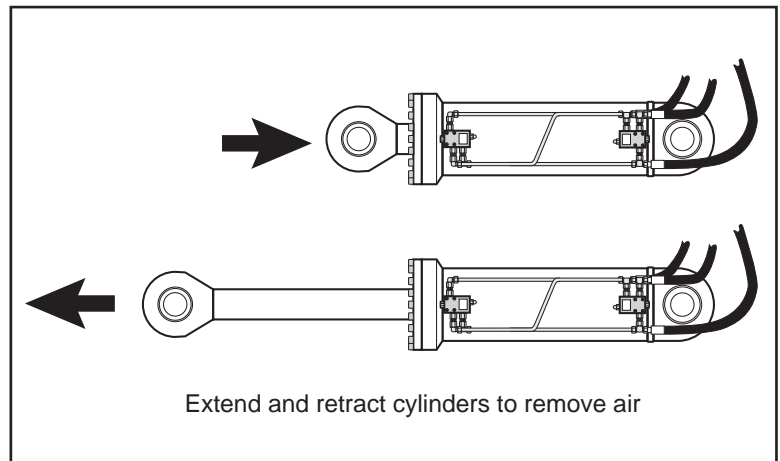
Stop the pump from cycling anytime the water box guards are removed. The water box presents a very serious crushing and amputation hazard because of the hydraulically driven rams inside. If you are going to change rams, NEVER put your hands into the water box when the cylinders are moving or when attempting to hold the replacement piston head in place. Use a nylon strap, belt, or towel to hold the piston in place as you push it into the cylinder. Do not attempt to hold it in place with your hands. If you get caught in the piston moving into the cylinder, you will be killed or seriously injured. All rules and instructions provided by the manufacturer must be followed explicitly.



⚠️WARNING Crushing and amputation hazard. Never work in the hopper or on the agitator unless the truck is out of gear or the engine is shut off, and you have verified zero accumulator pressure. If the valve shifts or the agitator accidentally gets turned on, you could be seriously injured or killed.

⚠️WARNING Injection and explosion hazard.

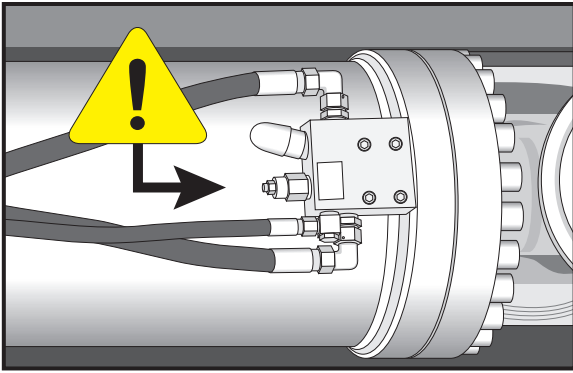
Never work on a pressurized hydraulic system! Follow the manufacturer's instructions when performing hydraulic system maintenance. Bleed the air from any cylinder that has been opened by attaching the blind end, hooking up the hydraulic hoses, and cycling the cylinder (full extend and retract) several times prior to reattaching the live end.



⚠️WARNING Explosion hazard. NEVER CHARGE AN ACCUMULATOR WITH ANYTHING BUT DRY NITROGEN! Oxygen or other gases can create an explosion when compressed in an accumulator and lower the flash point of hydraulic oil to below room temperature.

⚠️WARNING Burn hazard. Be careful of hot hydraulic oil; oil can get hotter than 176 degrees Fahrenheit or 80 degrees Celsius during a day's work with a concrete pump. Never try to tighten a leaking fitting from below when the oil is hot. If the fitting should break, it can burn you severely. Again, never work on a pressurized hydraulic system.





⚠ WARNING Pressure may remain in cylinder unless the boom is completely supported. Before removing a holding valve, be SURE all pressure is removed.

⚠ WARNING Impact and burn hazards. NEVER remove a boom holding valve without first supporting the weight of the affected boom section. The boom must be completely at rest with the load fully supported and relieved of any pressure before the holding valve is removed. Even then, holding valves must be removed with caution. If any pressure remains, it could cause the valve to be ejected violently from its mounting when the bolts are loosened. The same result will occur when working on the holding valve of an outrigger foot or any other component that can be affected by gravity. Remove holding valves slowly, listening and watching for indications of oil under pressure. Stand out of the path of the valve, should it fly from its mount under force.

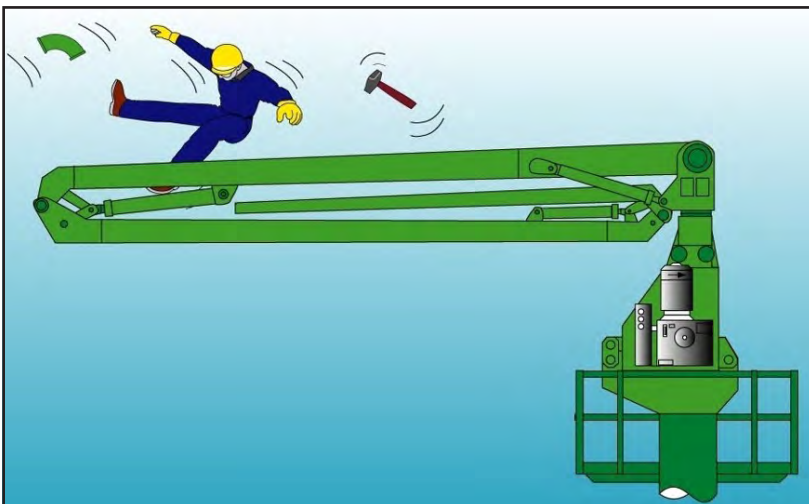


⚠ WARNING Oil injection hazard. NEVER try to stop or put your hand over a high-pressure oil leak by covering it with a rag or your gloved hand. Oil injection injuries are very dangerous and when oil is injected into the flesh, the result is almost always gangrene.

****Would you want to include the phone number for John Deere regarding oil injection injury here?**

NOTICE Use proper lubricants! All manufacturers recommend a certain lubricant for each specific component requiring lubrication. Always follow these recommendations.

⚠ WARNING Explosion hazard. NEVER USE GASOLINE, KEROSENE, OR DIESEL FUEL AS A CLEANING SOLVENT, especially with hydraulics, as they may explode under pressure.



⚠ WARNING Falling hazard. Do not climb onto the boom of a concrete pump! Always use a safety ladder or approved work platform.

⚠️WARNING Tipping and boom collision hazard. Set the outriggers before lifting the boom out of the cradle. If you remove the turret motor or brake valves for maintenance, be sure to set the outriggers and keep the boom in the cradle. Take steps, such as a lock out/tag out procedure, to ensure no one lifts the boom out of the cradle until the boom slewing mechanisms are intact.

⚠️WARNING Explosion hazard. Understand the hazards of spring-loaded and compressed gas components before you disassemble them! Never disassemble tires, brake assemblies, accumulators etc., without complete knowledge of the safe way to handle them and the hazards presented by doing so.

⚠️WARNING Boom failure hazard. Welding on any structural member may only be performed by a welder whose certification is approved by the manufacturer; each manufacturer has its own specific criteria which must be met. Contact the manufacturer of the pump for its welding procedures.

NOTICE Electronic components can be damaged by welding current; disconnect the batteries and unplug all electronic devices before welding.

NOTICE Never allow welding current to travel through bearings or hydraulic cylinders; keep the ground cable on the piece being welded.

⚠️WARNING Stored energy hazard. NEVER USE COMPRESSED AIR TO REMOVE A BLOCKAGE. If a pump is brought back to the shop with a boom full of concrete as the result of a blockage, you must remember that if the pump can't move it, air certainly will not. A concrete pump can supply much more pressure than air. The compressed air will only continue to be compressed and store very dangerous levels of energy and could eventually explode and cause severe injury to anyone in the area.

If air has been introduced into the boom and the concrete was not expelled, it is imperative that all air be released from the boom before any clamp is removed. Even then, use a shovel or pry bar to remove the clamp keeping your body well clear in case some air is trapped between sections of concrete still in the boom. Remember, even if the air blow was attempted the previous day, air will likely remain in the boom. If you open a clamp with air in the line, you could be killed or seriously injured.



⚠️WARNING Back injury hazard. LIFT WITH YOUR LEGS, NOT YOUR BACK! Improper lifting techniques are responsible for many serious back injuries every year.



⚠️ WARNING **Crushing and amputation hazard.** Replace all guards that were removed during maintenance.

⚠️ WARNING **Multiple eye hazards.** Wear safety glasses when working in the shop area. A full-face shield should be worn any time flying debris is a possibility such as: grinding; welding; and chipping slag.

Use the right tool for the job! Injuries occur each year from people using the wrong tool while performing maintenance.

⚠️ WARNING **Multiple hazards.** Do not bypass safety devices. If they are bypassed by the operator on the job to complete the pour, be sure they are replaced before the pump is put back into service. Many of the pumps have E-stop bypasses on them. Be absolutely certain these problems are corrected, and the E-stops are operational before the pump is put back into service.

Replace damaged or unreadable safety decals. These can be purchased for a nominal fee from the manufacturer.

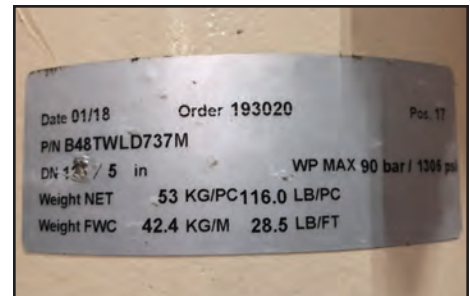
***Rob suggested adding a glossary*

- If the safety alert symbol is followed by the signal word **DANGER** with white letters in a red box (**⚠️ DANGER**), it indicates a hazardous situation which, if not avoided, **WILL** lead to **death or serious injury**.
- If the safety alert symbol is followed by the signal word **WARNING** with black letters in an orange box (**⚠️ WARNING**), it indicates a potentially hazardous situation which, if not avoided, **COULD** result in **death or serious injury**.
- If the safety alert symbol is followed by the signal word **CAUTION** with black letters in a yellow box (**⚠️ CAUTION**), it indicates a potentially hazardous situation which, if not avoided, **COULD** result in **minor to moderate injury**.
- The signal word **CAUTION**, used in a yellow box, but **without the safety alert symbol** (**CAUTION**), means the point addresses a hazard which, if not avoided, **COULD** cause **damage to equipment or property**. See the note below.
- The signal word **NOTICE** is used when contact with the hazard could result in damage to equipment or property. As you can see, it does **NOT** make use of the Safety Alert Symbol.

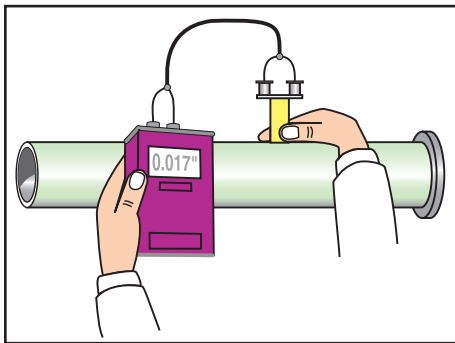
RULES FOR CONCRETE BOOM PIPELINE

1. Never install boom pipe that is too large or heavy on the boom as this may cause tipping or boom damage. Refer to the data tags on the pump and the pipe to be sure that the correct weight-per-foot pipe is being used.

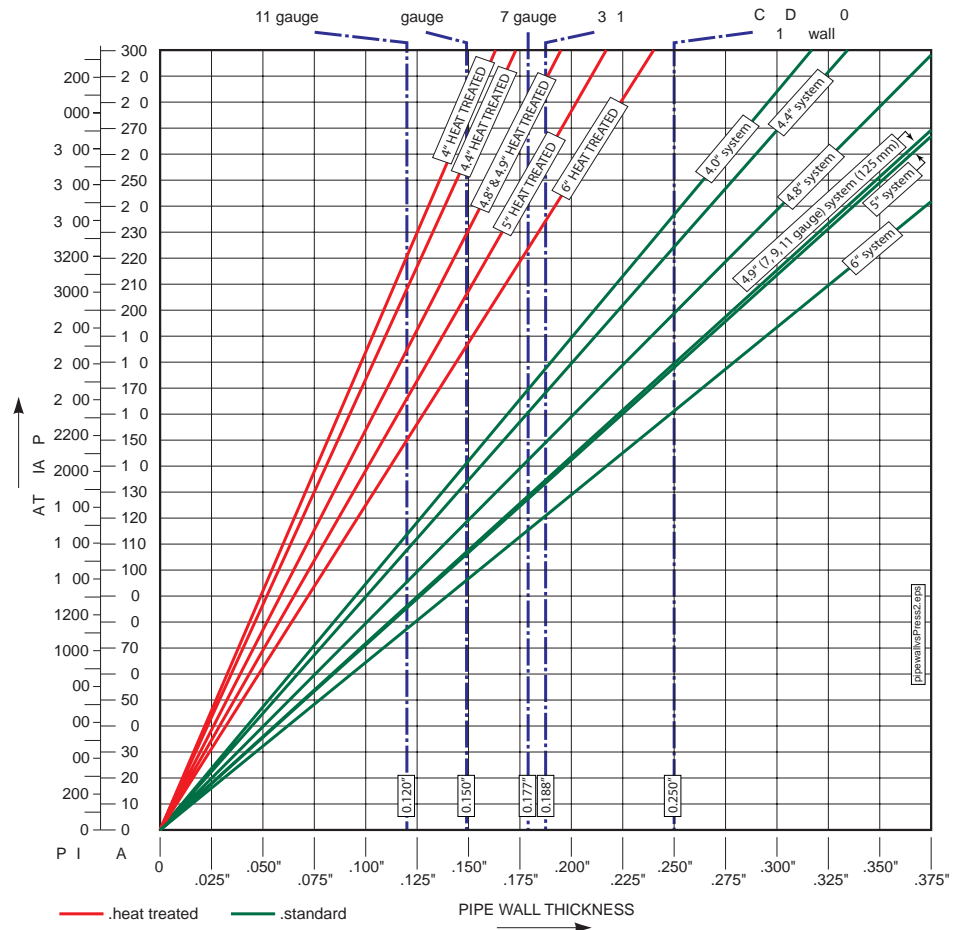
IMPORTANT!	IMPORTANT!	¡IMPORTANTE!	376 Lbs.
● MAXIMUM TOTAL WEIGHT (including concrete) of system components hanging from this boom:	POIDS TOTAL MAXIMUM (béton compris) des composants du système suspendus à cette flèche:	PESO TOTAL MÁXIMO (incluido el concreto) de componentes del sistema colgando de esta pluma:	171 Kg.
Do not paint over this label/Ne pas peindre sur cette étiquette de signalisation/No pintar encima de ésta etiqueta (part number here)			



2. Remember that pipeline wears out with each stroke of the pump.
3. Install only new pipe on a boom. A worn pipe could burst over workers.
4. Make sure the pipe pressure rating meets or exceeds that of the pumping pressure.
5. The pipe should be checked on a regular basis with an ultrasonic thickness tester or long-arm calipers.



6. Use the pipe wall thickness chart from the pipe manufacturer or the ACPA Safety Manual.
7. Remember that rubber hose wears out just like pipe and must be checked regularly as well. Hose should be removed from service when the inside lining wears enough to show the reinforcement braiding.
8. Never beat on a pipe with a hammer. It will wear out at the dents; and if it is a twin-wall pipe, you may break the inner liner.

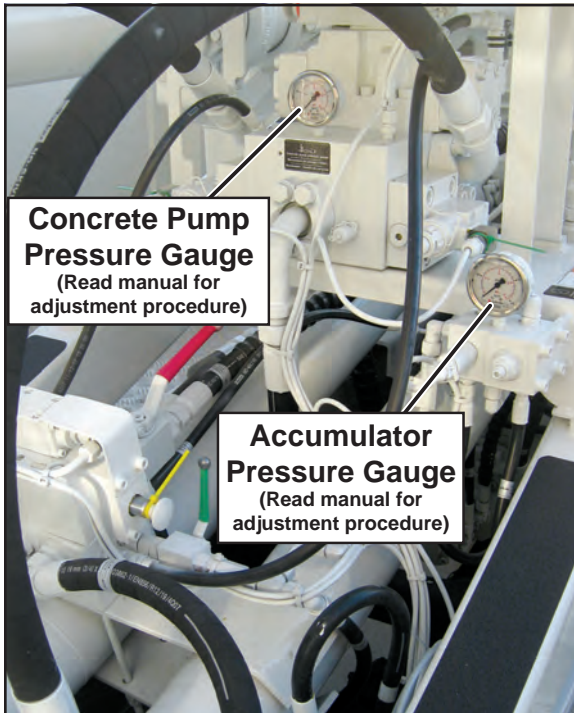
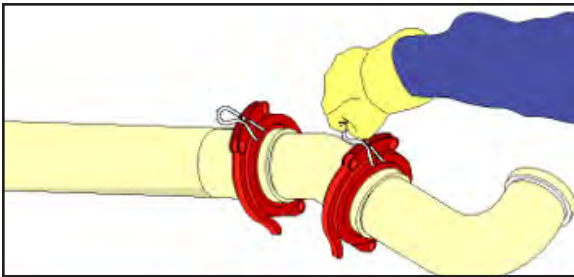


1. This chart assumes a safety factor of 2:1. Higher safety factors may be required in some circumstances.
2. Wear reduces wall thickness. Thickness must be checked on a regular basis.
3. Pressures may be limited even more by clamp style or pipe end used.
4. The chart is based on 62,000 PSI tensile strength. Heat-treated calculations are based on 120,000 PSI tensile strength.
5. The chart is for pressure calculations ONLY. There is no allowance for mechanical forces other than pressure, and thicker walls may be needed for mechanical strength because of support or restraint considerations.
6. The chart does not take into account metal fatigue caused by pressure cycles.

Note! This chart is intended as a guide for concrete pumping applications and is subject to the notes, assumptions, and conditions listed above. Any other use of this chart is not recommended.

This chart does not apply to double-wall pipe. Double-wall pipe can be checked by inspecting the inside of the pipe. If the insert is intact, the pipe is okay. If the insert is worn through, the pipe must be replaced. Contact your pipe supplier for the pressure capacity of your double-wall pipe.

RULES REGARDING SCHEDULED MAINTENANCE



1. Timely maintenance is crucial to the safe operation of a pump and boom.
2. Keep the pump clean to prevent falls; a clean pump will allow cracks and hydraulic problems show up better.
3. Always reinstall the safety pins in the delivery line clamps.
4. Never change hydraulic pressure settings or make modifications to structural members or pressure circuits without consulting the manufacturer's recommendations.
5. Replace damaged or unreliable hydraulic or pipeline components.
6. Never use damaged or defective components.
7. If pressures are changed prior to replacing parts or during the testing procedure, be sure the pressures are returned to the manufacturer settings.
8. Be sure that all maintenance is properly documented.



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