



# SAFETY MANUAL

A GUIDE FOR THE PREVENTION OF ACCIDENTS  
WHEN DRIVING, OPERATING, CLEANING, AND MAINTAINING  
CONCRETE PUMPS, PLACING BOOMS AND RELATED EQUIPMENT

TRANSLATED FROM ORIGINAL LANGUAGE



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WHEN DRIVING, OPERATING, CLEANING, AND MAINTAINING  
CONCRETE PUMPS, PLACING BOOMS AND RELATED EQUIPMENT



**WARNING: READ AND MAKE SURE YOU UNDERSTAND THIS MANUAL BEFORE USING THE MACHINE.**

**WARNING: KEEP THIS MANUAL INSIDE THE MACHINE.**

INSTRUCTIONS TRANSLATED IN ENGLISH			Date Created
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## INTRODUCTION

Safety is one of the major concerns of every person involved in the concrete pumping industry. Although much of the responsibility for everyday safety rests upon the pump operator, it is vital that everyone involved makes safety the top priority. This includes the owners, the mechanics, the ready mix drivers, the placing crew, the concrete contractors and the machine manufacturers.

Although this safety manual covers a great deal of information regarding the prevention of accidents while operating a concrete pump or placing boom, it is unlikely that every conceivable circumstance has been covered. Regardless of how thorough a manual like this may be, there is always the unexpected. Please understand that there is no substitute for COMMON SENSE and a dedication to the rule that you are responsible for your own safety, and the safety of those around you. You have to know the rules first, but you must keep your mind on the job if knowledge of the rules is going to keep you and

your co workers alive and well. No attempt has been made in this safety manual to provide the highly specialized knowledge of the workings of the individual machines that is also critical for safe and proper operation. For that, you must READ AND UNDERSTAND THE OPERATION MANUAL FOR THE MACHINE(S) THAT YOU OPERATE!

This safety manual is a guide for the prevention of accidents and is to be used in conjunction with PROFESSIONAL TRAINING



The symbol  represents a point that is particularly important.

If it is followed by the word WARNING, it means the rule addresses a circumstance that could lead to death or serious injury. If it is followed by the word CAUTION, it means the rule addresses a circumstance which may cause damage to equipment or machinery.

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# SAFETY MANUAL

## Section A

### CONCRETE PUMP SET-UP





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## GENERAL RULES

### A. CONCRETE PUMP SET UP

#### 1 WHAT TO DO BEFORE YOU ARRIVE AT WORK

- 1.1 Get enough sleep to be ready for the day's work. Accidents happen when the body is on the job, but the mind is not.
- 1.2 Dress in appropriate attire!. Snug fitting clothes, and steel toed work boots are examples of appropriate clothing. Jewelry, running shoes, and shorts are examples of inappropriate attire!.
- 1.3 Arrive to work on time. A major cause of accidents is hurry caused by arriving late.



#### 1.4 **WARNING!**

NEVER go to work on a construction site or work on, around or near a piece of machinery when under the influence of drugs or alcohol. Beware of "over the counter" drugs, many of which have specific warnings about operating machinery after taking the medication.

- 1.5 Don't bring your personal problems to work with you. In an office setting this may be annoying to co-workers, but on a construction site it can be deadly. The workers around you depend on you for their safety.



## 2 WHAT TO CHECK BEFORE YOU LEAVE THE YARD

### 2.1 WARNING!

**DO NOT ATTEMPT TO OPERATE THE MACHINERY UNLESS YOU TRAVE READ AND UNDERSTAND THE UNIT'S OPERATION MANUAL.** Lack of understanding of proper operating procedures results in unsafe operation. Operation manual are issued with each new unit. If you haven't seen it, ask your supervisor. Replacements are available from the manufacturer

### 2.2 Inspect delivery pipes and hoses for wear. Never use a worn hose or worn or dented pipe. **KNOW THE MAXIMUM PRESSURE THAT YOUR MACHINE CAN EXERT ON THE CONCRETE, AND BE SURE THAT THE PIPES, HOSES AND CLAMPS ARE CAPABLE OF HANDLING THIS PRESSURE.**

Maximum pressure on concrete is stated in operation manuals, service manuale, and in some cases stamped on the serial number piate of the machine. A chart showing the minimum wall thickness of pipeline versus maximum pressure is found in the "Appendix" section of this safety manual

### 2.3 Be sure that the unit is equipped with all the pipes, clamps, gaskets and hoses, blow out adapters, ball catchers, etc. that you will need for the day's work. "Making Do" with inappropriate equipment can cause accidente

### 2.4 Check all fluid levels on the unit you will drive to the job.

### 2.5 Be sure the battery has enough charge to start the pump drive engine. You will be rushed on the job if you travel to do repair work before you can begin operation

### 2.6 WARNING!

The operator is responsible for checking to see that the concrete pump, placing boom and delivery system are all in safe and proper working condition. If not, **WORK MUST NOT BEGIN** until necessary repairs trave been completed.

### 2.7 WARNING!

The operator is responsible for checking that all safety equipment, guards, and decals are in piace and are in good condition. If found to be missing, incomplete or damaged, **WORK MUST NOT BEGIN** until they trave been corrected.

2.8  **WARNING!**

Inspect the tires and brakes on the truck. Never drive a truck with bald or cracked tires, or with weak or worn brakes. If you have air brakes, be sure that the air system is free from leaks and will maintain pressure when driving. Loss of air pressure will cause the brakes to be applied while driving. If driving continues after the brakes are applied, the resulting friction could cause enough heat to start a fire.

2.9 Drain moisture from the air tanks that supply the unit braking (if so equipped). This is especially important if weather conditions could cause the moisture to freeze.

2.10  **WARNING!**

DANGER OF FALLING!. Mount or dismount the pump or truck using the “3 point rule” (Keep 2 hands and one foot or one hand and two feet in contact with a secure surface at ALL times).

2.11  **WARNING!**

DANGER OF FALLING!. Never mount or dismount the truck or pump while carrying objects that prevent you from using the “3 point rule”.

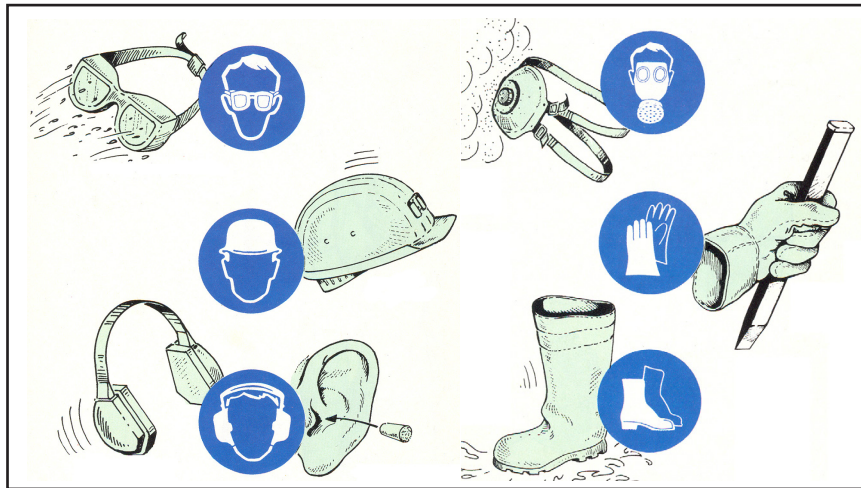
2.12  **WARNING!**

DANGER OF LIFE! Be sure that outriggers are pinned and locked before traveling. If the locking device is damaged or worn, you **MUST NOT DRIVE THE UNIT** until it is repaired.

2.13 Be sure there is nothing in the cab of the truck (such as empty soda cans, loose tools, etc.) that could interfere with the operation of the vehicle.

2.14 Be sure that all road related safety devices (warning signs, flares, fire extinguisher, etc.) are present and secured for travel.

2.15 Be sure all personal protective devices (hard hat, safety goggles, rubber gloves, etc.) are present and secured for travel.

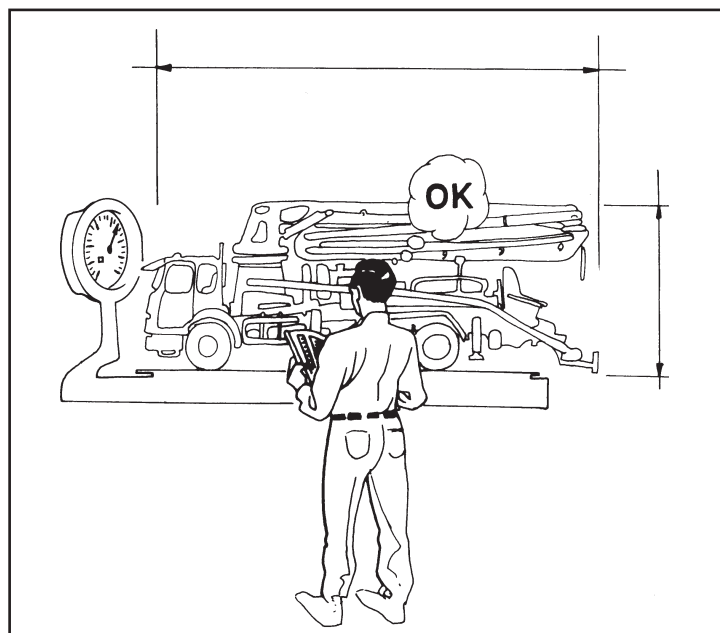


2.16 Be sure the windshield and mirrors are clean and free of frost or ice.

2.17 Verify that head lights, tail lights, turn signals, brake lights, back-up warning horn, and back up lights are operational.

2.18 In some cases you may be asked to operate a machine other than the one with which you are familiar. In these cases, be sure to:

a. KNOW THE WEIGHT, HEIGHT AND WIDTH of the machine.



Concrete Pump Set-Up

- b. Have a copy of the operation manual with you
  
- c. Ask the machine's normal operator, the dispatcher, or your supervisor questions regarding special operation characteristics of the machine.
  
- d. Do NOT attempt to operate a machine if it has a significantly different system or operating process than the unit on which you were trained. Your Co workers on the job depend on you to be an expert on your machine.

**2.19****WARNING!**

BE CERTAIN THAT ALL LOOSE ITEMS ON THE UNIT ARE SECURED FOR TRAVEL BEFORE DRIVING!

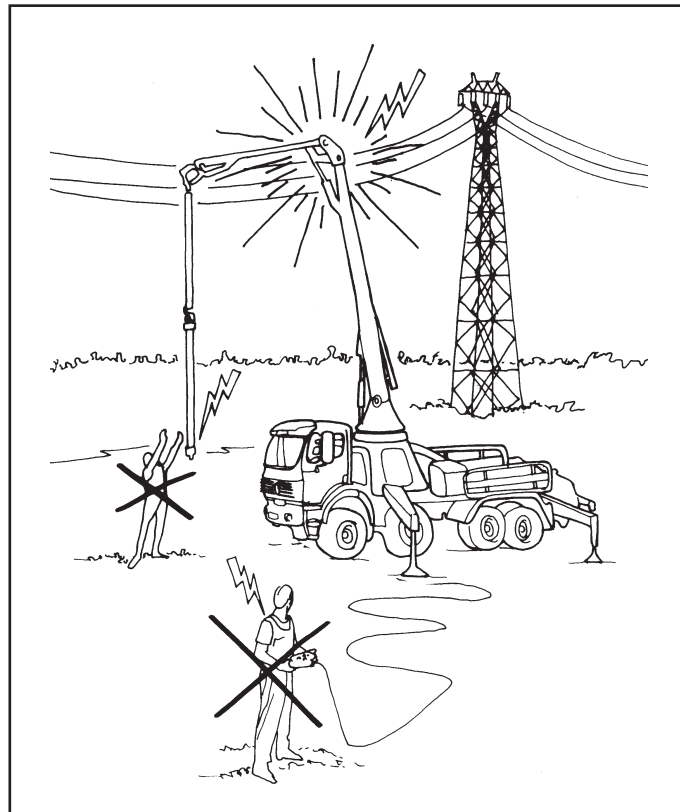
### 3 SAFETYRULES FOR DRIVING A TRUCK MOUNTED CONCRETE PUMP

- 3.1 CAREFULLY SELECT YOUR ROUTE OF TRAVEL. Avoid steep hills, residential areas, construction, low overpass clearances and narrow bridges whenever possible. THE DRIVER IS RESPONSIBLE FOR KNOWING THE WEIGHT AND HEIGHT OF THE MACHINE.



3.2 **WARNING!**

DANGER OF LIFE! If you're going to drive under overhead power lines and it is not possible to maintain adequate safety distance between the pump and the wires, YOU SHOULD LOOK FOR ANOTHER ROUTE! If none is available, contact the power company responsible for the lines and trave them de energized.



3.3 **WARNING!**

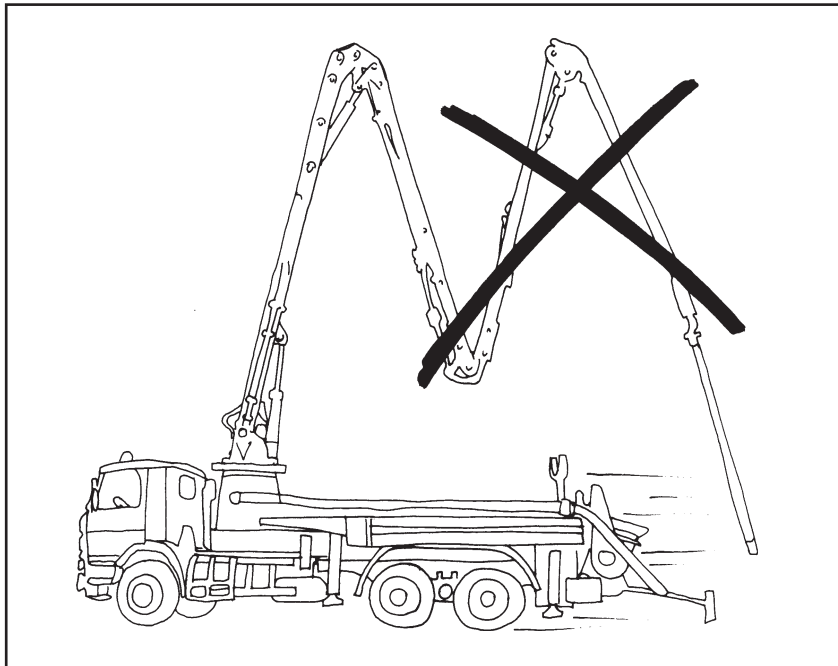
DANGER OF LIFE! Before driving on bridges, over arches, on elevated roadways, etc. BE SURE THAT THEY CAN SUPPORT THE WEIGHT OF THE VEHICLE. DANGER OF COLLAPSE!

3.4  **WARNING!**

DANGER OF COLLISION! Before driving under ANY structure, BE SURE that the machine will clear.

3.5  **WARNING!**

DANGER OF LIFE! The vehicle must NOT be driven with an unfolded placing boom. The vehicle may tip!



3.6  **WARNING!**

DAMAGE TO HYDRAULIC SYSTEM!. Before driving the unit be sure that the PTO or distribution gearcase has DISCONNECTED the hydraulic pumps. DRIVING WITH THE HYDRAULIC PUMPS ENGAGED CAN BE DANGEROUS, and is destructive to the pumps .

3.7 Never drive the unit with concrete in the hopper. Concrete could splash out and damage other cars or property.

3.8 Use the same gear going down a hill as you would to go up the hill.

3.9 Slow down at intersections, near playgrounds and near schools. Children have no knowledge of the increased stopping distances required by heavy vehicles.

- 3.10 Be familiar with your emergency equipment. Know how to light a flare, etc.
- 3.11 Drive defensively. You are at a distinct disadvantage when it comes to maneuverability and stopping distance.
- 3.12 Truck mounted concrete pumps are generally top heavy. Use caution when making sharp turns with the vehicle.
- 3.13 Know the correct places to hook up to the unit if it needs to be towed. Improper towing can very easily damage the vehicle or pump.
- 3.14 NEVER back up without a guide.
- 3.15 Know the rules and laws that apply to your state and locality. They have been enacted for your protection and the protection of those around you.

## **4 SAFETYRULES FOR TOWING TRAILER MOUNTED CONCRETE PUMPS**

- 4.1 Be sure that the towing vehicle is heavy enough and has enough strength and horsepower to tow the trailer. This is critical in regards to maintaining control at highway speeds, and braking ability. If the trailer is heavier than the towing vehicle, braking distances will be greatly increased. This is UNSAFE.
- 4.2 Check the tires and brakes on the trailer before towing. Never tow a vehicle with cracked or bald tires. A trailer tire blow out can cause loss of control in the towing vehicle.
- 4.3 Be especially careful on ice or slippery roads when towing a trailer. A skid that would normally be easily correctable can be multiplied by the trailer, causing loss of control.
- 4.4 Be sure that the electrical connections between the towing vehicle and the trailer are sturdy and reliable.
- 4.5 Always use safety chains and break away protection when towing a trailer.
- 4.6 Be aware of local or state regulations regarding mirrors and lights when towing a trailer.
- 4.7 When towing a trailer, your stopping distances and turning radii are greatly increased. Be aware of this AT ALL TIMES.
- 4.8 When towing a trailer long distances, it is important to check the hitch, wiring, and safety chains frequently.
- 4.9 Be aware of your length when towing a trailer. A common cause of trailer accidents is turning too close to curbs or objects.
- 4.10 Backing up a trailer without a guide is foolhardy. Always use a guide.



## 5 SAFETY RULES FOR JOB SET UP DI LAVORO

### A. SETTING UPA TRUCK MOUNTED BOOM PUMP

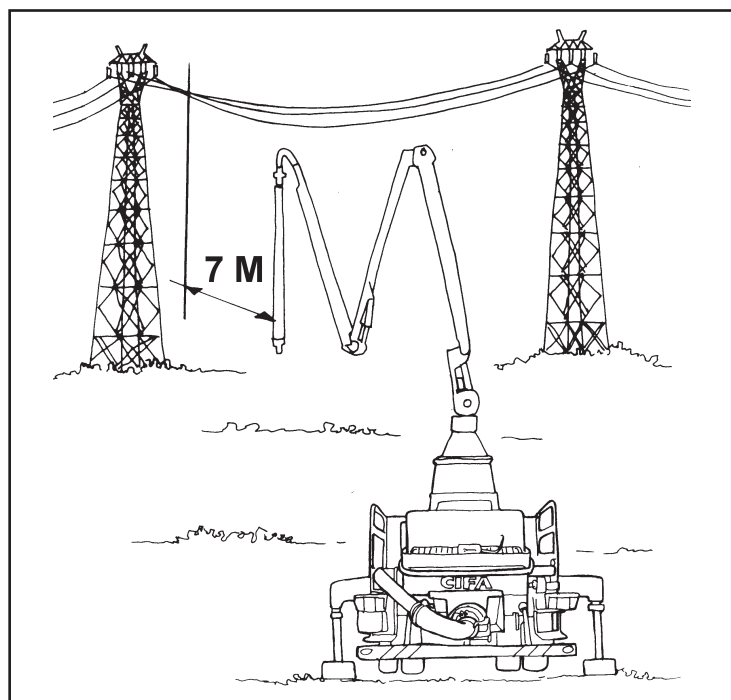
5.1 BE AWARE THAT THE JOB SET UP PHASE SETS THE STAGE FOR MOST ACCIDENTS. Taking a few extra moments to correctly set up the job will improve your chances for having a safe, trouble free day.

5.2 **THE OPERATOR IS RESPONSIBLE UNDER ALL CIRCUMSTANCES FOR THE SAFE OPERATION OF THE MACHINE. NOTIFY YOUR EMPLOYER, THE JOB SUPERINTENDENT, AND/OR O.S.H.A. IF YOU ARE BEING ASKED TO SET UP IN AN UNSAFE MANNER.** You are never required to take a chance with safety. YOU ARE THE PERSON on the job that has the responsibility over whether or not you have a safe pour.



#### 5.3 **WARNING !**

**DANGER OF LIFE! YOU MUST AVOID HAZARDOUS PROXIMITY OR CONTACT WITH ANY ELECTRIC LINE UNDER ALL CIRCUMSTANCES.** Set up the machine so a minimum safety distance of 17 feet (5 meters) is maintained in all boom positions needed to do the job. If it is not possible to maintain 17 feet clearance at the point of placement, you must lay a separate pipeline or use a different placement method. (See the illustrations below). **UNDER NO CIRCUMSTANCES SHOULD YOU DECREASE THE SAFETY DISTANCE TO REACH AN UNSAFE AREA WITH THE BOOM.**



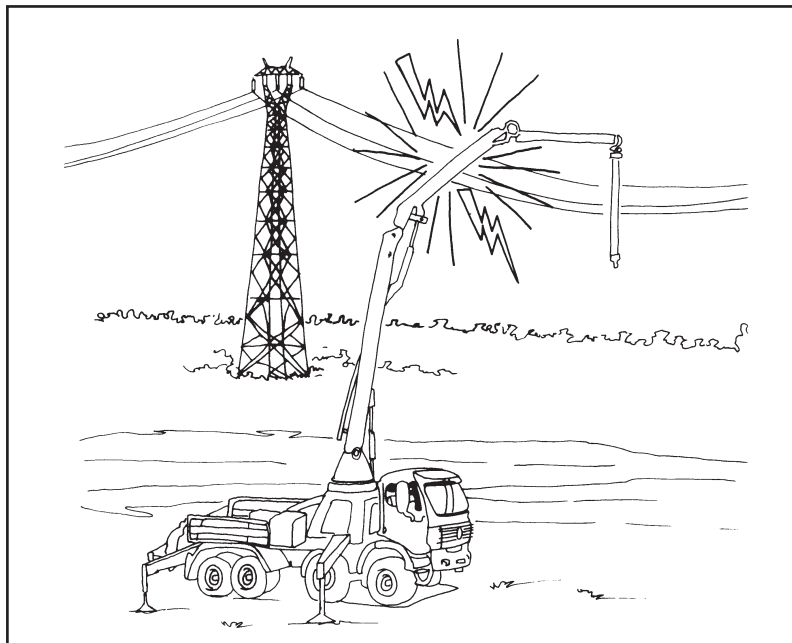
Concrete Pump Set-Up

5.4  **WARNING !**

DANGER OF LIFE! IF YOU ARE IN DOUBT ABOUT YOUR PROXIMITY TO HIGH VOLTAGE WIRES IT IS BETTER TO LAY A SEPARATE PIPELINE AND NOT USE THE BOOM THAN TO RISK ELECTROCUTION TO YOURSELF OR OTHERS ON THE JOB. NEVER TAKE CHANCES WITH HIGH VOLTAGE!

5.5  **WARNING !**

DANGER OF LIFE! IT IS CRUCIAL TO TAKE ELECTRIC WIRES INTO CONSIDERATION DURING SET UP, EVEN IF THEY ARE AWAY FROM THE AREA TO BE PUMPED! Accidents may occur during clean out and moving that can be avoided by proper initial set up.

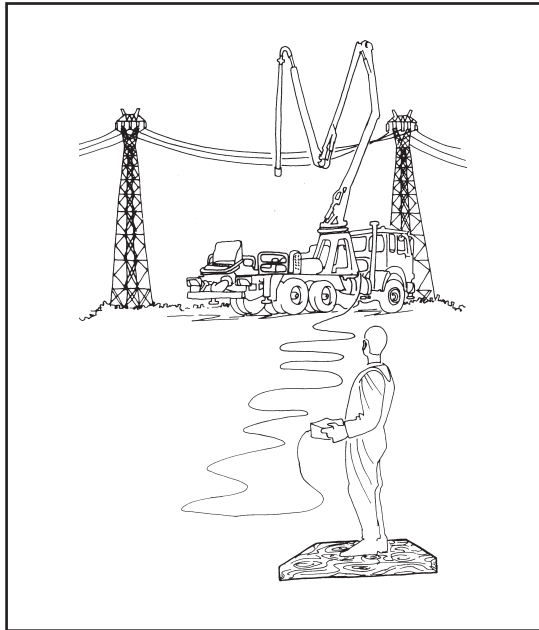


5.6  **WARNING !**

DANGER OF LIFE! DEPTH PERCEPTION VARIES FROM PERSON TO PERSON AND IS AFFECTED BY THE DISTANCE FROM THE OBJECTS BEING OBSERVED. MINIMUM DISTANCES SHOULD ALWAYS BE JUDGED BY PLACING YOURSELF IN A VIEWING POSITION THAT DOES NOT REQUIRE DEPTH PERCEPTION JUDGEMENTS. IF THIS IS NOT POSSIBLE, A SPOTTER MUST BE USED!

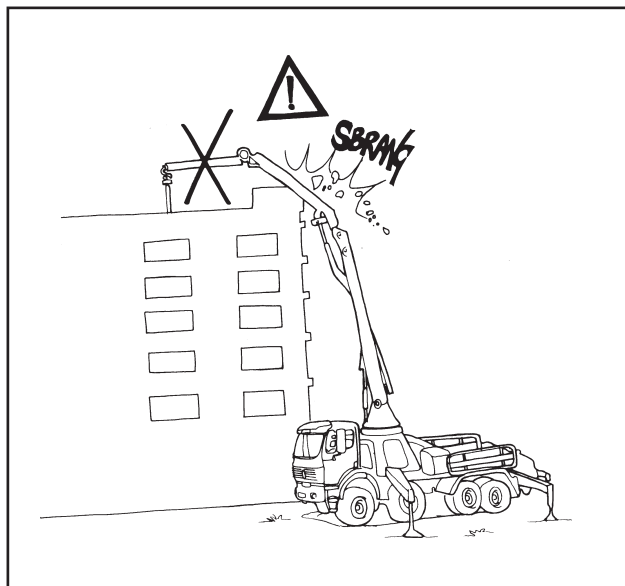
5.7  **WARNING !**

DANGER OF LIFE! ALWAYS ASSUME THAT A POWER LINE IS LIVE. NEVER TAKE THE WORD OF SOMEONE ON THE JOBSITE THAT IT HAS BEEN DE-ENERGIZED. ONLY A QUALIFIED REPRESENTATIVE OF THE RESPONSIBLE POWER COMPANY CAN VERIFY THAT A LINE HAS BEEN DE-ENERGIZED.



5.8  **WARNING !**

IT IS ESSENTIAL TO MAINTAIN A SAFE DISTANCE FROM OBSTRUCTIONS, SUCH AS CRANES, SCAFFOLDING, BUILDINGS, ETC.



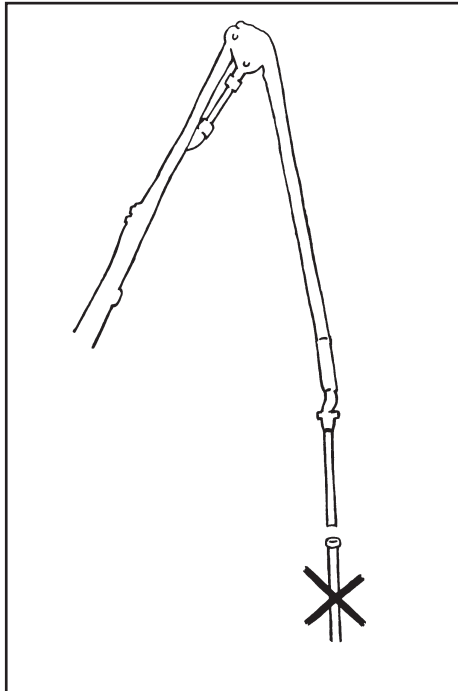
Concrete Pump Set-Up

5.9 Remove any snow, ice, oil or dirt from steps and platforms.

5.10  **CAUTION !**

POSSIBLE BOOM DAMAGE!

NEVER ADD EXTENSIONS TO THE END OF THE PLACING BOOM! If continuation pipes are connected to the end hose, they MUST NOT impose any load on the boom.



5.11  **WARNING !**

THE LENGTH OF THE END HOSE MAY NOT EXCEED 13 FEET (4 METERS).

5.12  **WARNING !**

If the supplied end hose is replaced with a combination of reducers and hoses, for example a 5n 4" reducer and a 4" hose) then any and all hoses, reducers, etc. must be fastened with safety cables and may not exceed the weight of the supplied end hose. Pin all clamps. ANY reducer, hose, clamp, etc. MUST BE CAPABLE OF HANDLING THE MAXIMUM CONCRETE PRESSURE OF THE MACHINE.

5.13 CONSIDER THE SAFE APPROACH AND DEPARTURE OF THE READYMIX TRUCKS AND ADJUST YOUR SET UP ACCORDINGLY. Often times, adjusting your set up position by a few degrees one way or another will mean the difference between a safe approach and an unsafe approach

5.14  **WARNING!**

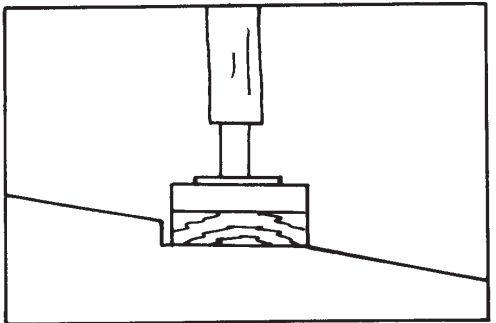
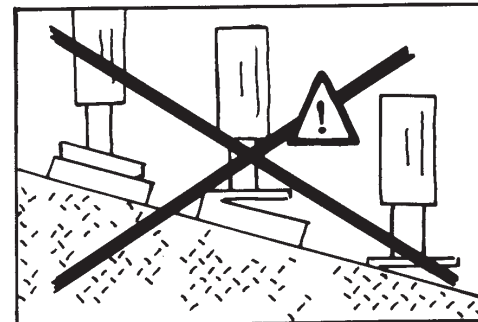
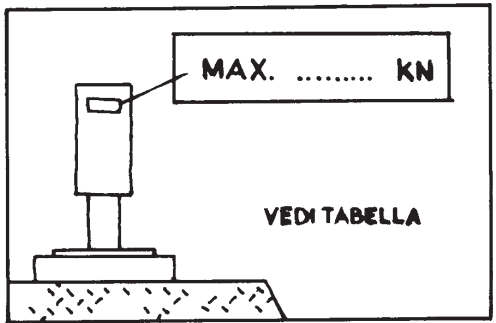
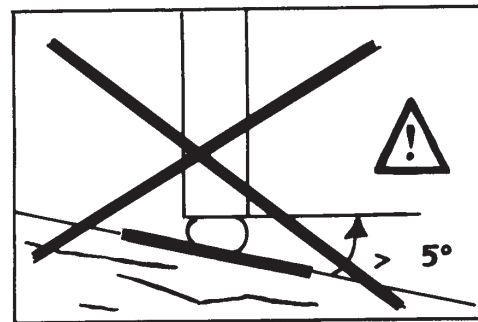
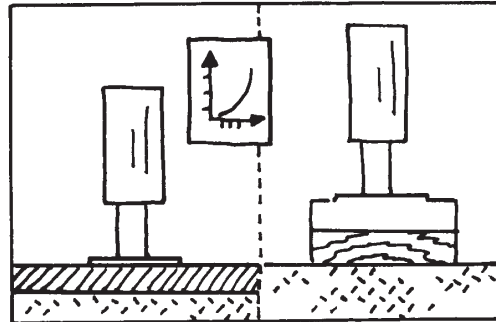
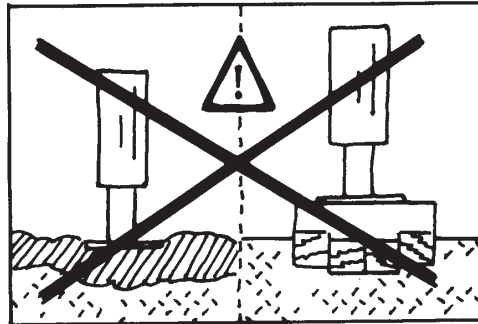
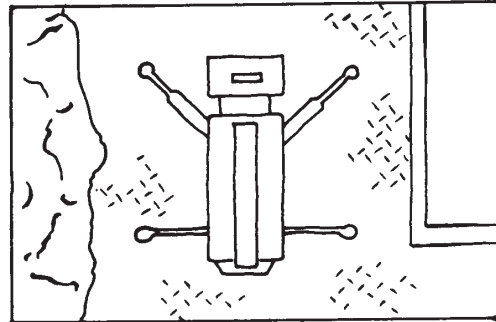
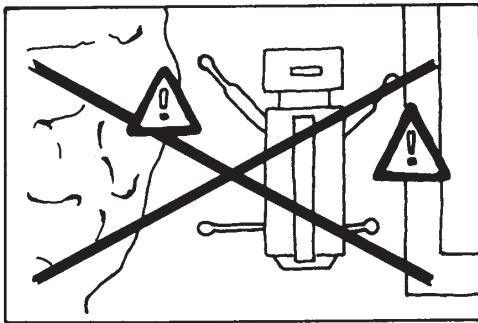
Placing booms possess a very wide effective operating range. Due to this high degree of mobility, some placing booms can reach a position unsuitable for practical operation. Under certain circumstances OVERLOADING, TIPPING, OR DAMAGE TO THE BOOM IS POSSIBLE. These DANGER areas are documented on safety decals and the operation manual. BE AWARE OF THESE AREAS IF THEY APPLY TO YOUR UNIT AND SET UP THE PUMP TAKING THESE AREAS INTO CONSIDERATION.

5.15



**WARNING !**

DANGER OF TIPPING! Great care must be taken when jacking the outriggers. Do not set up on uneven or hilly soil, and never bridge a hole with cribbing. Dig a fiat spot in the soil, if necessary.!



5.16

**WARNING !**

DANGER OF TIPPING! Check soil conditions before jacking the outriggers. If necessary, use cribbing or suitable pads under the outrigger legs to increase the area of soil contact. See the following chart for samples of load bearing capacities of various soil types, and examples of how to calculate how much cribbing is needed. If in doubt, the site management can supply the load bearing capacity of the soil. The STABILITY OF THE UNIT MUST BE ENSURED.

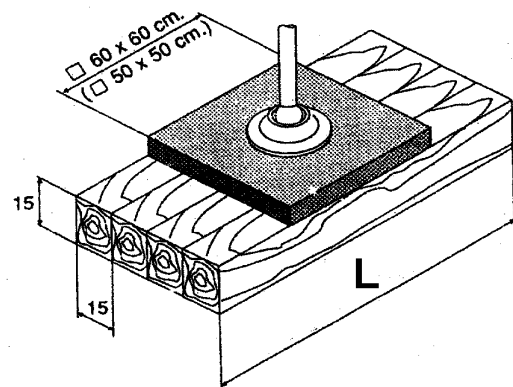
Suggested contact pressure [kN/mq]	Vertical charge [kN] to be read on the stabilizer																										
	Plates 60x60																										
	50	75	100	125	150	175	200	225	250	275	300	325	355	375	400	450											
		Length of square wooden joists (cm)					Ground not suitable for bearing																				
Natural ground	150	150	84	112	139	167																					
Asphalt with 20 cm min. thickness	200	200	63	84	105	125												146	167								
Compacted crushed stone	250	250	67	84	100	117												134	150	167							
Compacted slimy clayey ground	300		300	70	84	98												112	125	139	153	167					
Compacted granulated mixed ground	350			350	72	84												96	108	120	131	143	155				
Well compacted gravel	400			400	63	73												84	94	105	115	125	136	148	157	167	
	500					500	67	75	84	92	100	109	119	125	134	150											
	750								750	62	67	73	79	84	89	100											
Friable and crumbly rocks by the atmospheric agents	1000	With CIFA Plates without square wooden joists (15x15)								1000																	

L= length of square wooden joists (cm)

**Example: Granulated ground**      350      kN/mq  
 Vertical charge on bearing stool      175      kN  
 Dimensions of bearing surface      60 x 60      cm  
 Length of square wooden joists      84      cm

**Example: Compacted gravel**      500      kN/mq  
 Vertical charge on bearing stool      150      kN  
 Dimensions of bearing surface      60 x 60      cm  
 Length of square wooden joists      not suitable ground

**Example: Natural ground**      150      kN/mq  
 Vertical charge on bearing stool      200      kN  
 Dimensions of bearing surface      60 x 60      cm  
 Length of square wooden joists      not suitable ground



**WARNING !**

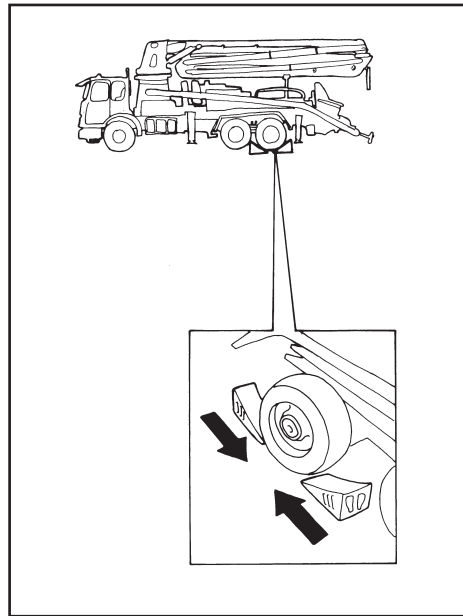
If the load of the stabilizer does not exactly coincide with the value indicated in the table, it must assume the first higher value (for. Example for an effective stabilizer machine load = 335 kN use of wooden strips of the length indicated in the column of the table 355 kN)



5.17  **WARNING !**

DANGER OF TIPPING! Maintain a safe distance between the unit and the edge of a cliff or any excavation. The rule of thumb is: for every foot of drop, stay back from the edge 1 foot (the one to one rule).

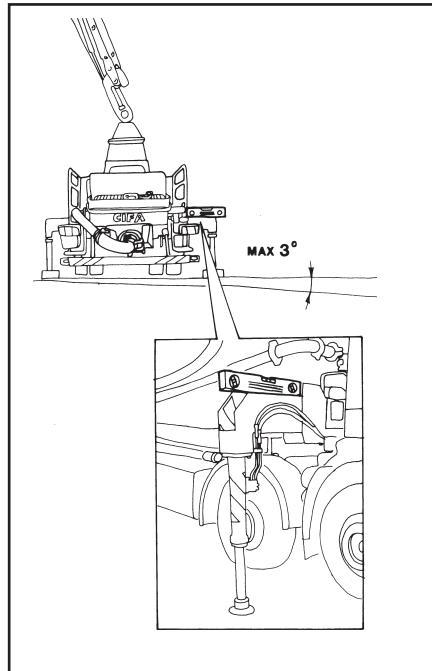
- 5.18 Place wheel chocks under the tires on sloping terrain. Release the brakes and allow the machine to settle against the chocks, then re apply the brakes.



5.19  **WARNING !**

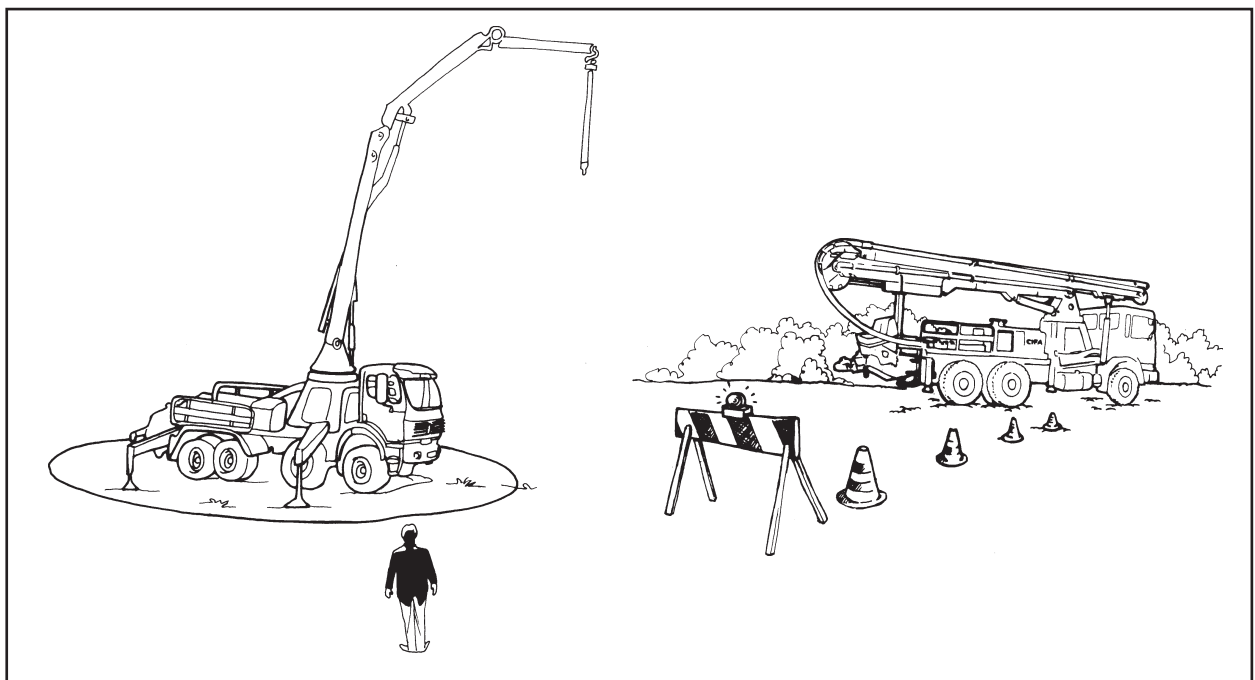
When you have the outriggers positioned correctly, close all the outrigger hydraulic shut off valves.

5.20 When setting the outriggers, be sure that you jack the pump to within 3° of level.



5.21  **WARNING !**

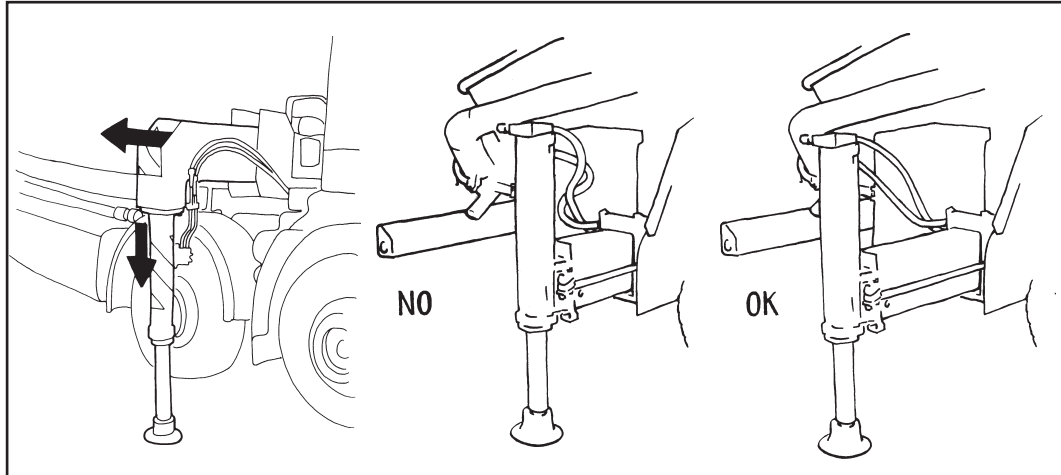
DANGER OF COLLISION! SECURE THE IMMEDIATE AREA OF THE MACHINE FROM PUBLIC TRAFFIC in accordance with all applicable regulations (warning lights, safety cones, barricades with flashers, etc.).



5.22

**WARNING !**

DO NOT UNFOLD THE BOOM UNTIL THE OUTRIGGERS HAVE BEEN CORRECTLY POSITIONED AND SECURED! THE OUTRIGGERS MUST BE COMPLETELY EXTENDED AND OPENED AS DESCRIBED IN THE OPERATION MANUAL. INTERMEDIATE POSITIONS ARE NOT SAFE!



5.23

**WARNING !**

DANGER OF LIFE! DO NOT UNFOLD THE BOOM WHEN LIGHTNING IS PRESENT IN THE AREA.

5.24

**WARNING!**

DO NOT USE THE DISTRIBUTION BOOM IN CASE OF HIGH WIND.

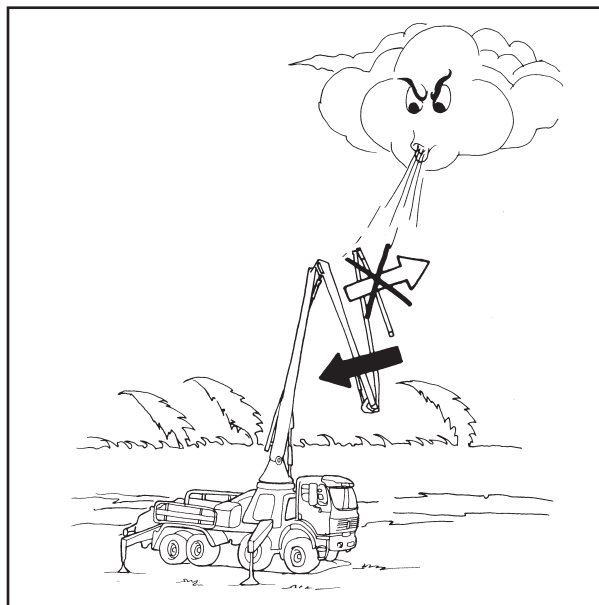
**a) TRUCK MOUNTED PUMPS**

- Distribution booms with vertical height of 42m or more cannot be operated anymore with wind intensity equal or over 7 (wind speed from 50 km/h = 14 m/sec and over).
- Distribution booms with vertical height lower than 42m cannot be operated anymore with wind intensity equal or over 8 (wind speed from 72 km/h = 20 m/sec and over).

**b) TRUCK MIXER PUMPS**

- For booms assembled on truck mixer pumps the maximum wind speed in working conditions shall not be higher than 8 (wind speed of 72 km/h = 20 m/sec). Until 72 Km/h the boom can work, over it must be folded to road transportation conditions.

**Wind speed higher than those indicated endanger stability, safety of structural elements and SAFETY CONDITIONS FOR WORK ARE NOT GUARANTEED**



**Wind speed Beaufort Scale**

Wind strength		Wind speed		Wind effect
Grade	Type	m/s	Km/h	
0	Calm	0 - 0,2	<b>0 - 1</b>	Smoke rises vertically
1	Light air	0,3 - 1,5	<b>2 - 5</b>	Wind movement visible from smoke
2	Gentle breeze	1,6 - 3,3	<b>6 - 11</b>	Wind can be perceived on the face, leaves move.
3	Breeze	3,4 - 5,4	<b>12 - 19</b>	Constant movement of leaves and thin branches
4	Intense breeze	5,5 - 7,9	<b>20 - 28</b>	Movement of branches, dust and paper rise
5	Fresh breeze	8,0 - 10,7	<b>29 - 38</b>	Small size trees start to swing.
6	Fresh wind	10,8 - 13,8	<b>39 - 49</b>	Movement of thick branches; difficulty to use umbrella
7	High wind	13,9 - 17,1	<b>50 - 61</b>	Big trees sway; difficulty to move forward
8	Moderate gale	17,2 - 20,7	<b>62 - 74</b>	Branches break, walking is hard.
9	Heavy gale	20,8 - 24,4	<b>75 - 88</b>	Houses damaged, shingles fly away.
10	Storm	24,5 - 28,4	<b>89 - 102</b>	Trees are pulled-up; heavy damages to houses.
11	Heavy storm	28,5 - 32,6	<b>103 - 117</b>	Heavy structural damages
12	Hurricane	32,7 +	<b>118 +</b>	Enormous and extended damages to structures

5.25 If you will be unable to see the end of your pipeline, establish a system of communications with the workmen that will be at the point of discharge. AGREE ON HAND SIGNALS BEFORE THE POUR BEGINS!

5.26  **CAUTION !**

POSSIBLE BOOM DAMAGE! If you will be pumping out of the boom into a separately laid pipeline, you must use a flexible hose to connect them. You must not directly connect steel pipe to the boom. BE SURE THAT THE HOSE IS CAPABLE OF HANDLING THE MAXIMUM CONCRETE PRESSURE OF THE PUMP.

5.27  **WARNING !**

DO NOT USE THE PLACING BOOM ON A TRUCK MOUNTED CONCRETE PUMP FOR HIGH PRESSURE PUMPING (OVER 1000 PSI, OR 70 BAR CONCRETE PRESSURE).

This means that you cannot pump through the boom if your machine is configured for piston side operation. If piston side pumping is indicated, YOU MUST LAY SEPARATE PIPELINE. An explanation of piston side" operation is described in the operation manual.

5.28  **WARNING !**

PIPELINES, END HOSES, COUPLINGS, ETC. MUST BE IN GOOD CONDITION TO BE USED. Concrete pipeline system is subject to wear, which is affected by pumping pressure, concrete composition, pipeline material, etc. Read and understand the minimum wall thickness chart in the appendix section of this manual. The use of ultrasonic equipment is highly recommended for determining pipe wall thickness.

5.29  **WARNING !**

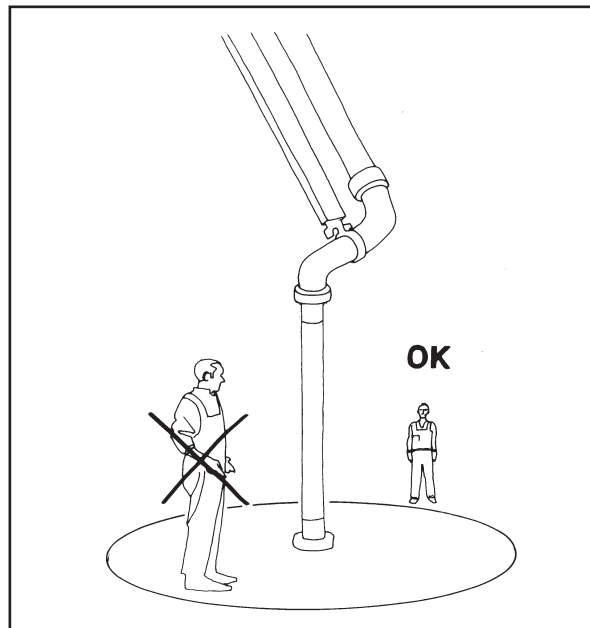
ONCE THE MACHINE IS READY TO WORK, SECURE IT AGAINST UNAUTHORIZED USE! Either stay with the unit or make sure no one can start it without you. This would include locking the remote control box (cable or radio) in the cab of the truck.

5.30  **WARNING !**

WATCH FOR CHILDREN! ONCE THE MACHINE HAS BEEN JACKED UP ON THE OUTRIGGERS IT IS VERY EASY FOR CHILDREN TO ACCESS THE SPACE UNDERNEATH THE MACHINE.

5.31  **WARNING !**

IF SPECTATORS WILL BE NEAR THE POUR CORDON OFF AN AREA WHERE THEY WILL BE SAFE.



**B. SETTING UP A TRAILER MOUNTED PUMP AND A SEPARATE PIPELINE**

5.32 BE AWARE THAT THE JOB SET UP PHASE SETS THE STAGE FOR MOST ACCIDENTS.

5.33 **THE OPERATOR IS RESPONSIBLE UNDER ALL CIRCUMSTANCES FOR THE SAFE OPERATION OF THE MACHINE. NOTIFY YOUR EMPLOYER, THE JOB SUPERINTENDENT, IF YOU ARE BEING ASKED TO SET UP IN AN UNSAFE MANNER. You are never required to take a chance with safety. YOU ARE THE PERSON on the job that has the responsibility over whether or not you have a safe pour.**

5.34  **ATTENZIONE !**

DANGER OF LIFE! The power connections for electrically driven concrete pumps or separate placing booms MAY ONLY BE MADE BY A LICENSED ELECTRICIAN. The supply power and appropriate disconnect boxes are the responsibility of the contractor. ELECTRICAL POWER ON THE JOB SITE MAY ONLY BE TAKEN FROM A FUSED, GROUNDED DISCONNECT BOX WITH DISCONNECT SWITCH THAT CAN BE LOCKED AGAINST ACTIVATION.

5.35 CONSIDER THE SAFE APPROACH AND DEPARTURE OF THE READYMIX TRUCKS AND ADJUST YOUR SET UP ACCORDINGLY.

5.36  **ATTENZIONE !**

DANGER OF COLLISION! SECURE THE IMMEDIATE AREA OF THE MACHINE FROM PUBLIC TRAFFIC in accordance with all applicable regulations (warning lights, safety cones, barricades with flashers, etc.).

5.37  **ATTENZIONE !**

PIPELINES, END HOSES, COUPLINGS, ETC.

MUST BE CAPABLE OF HANDLING THE MAXIMUM CONCRETE PRESSURE OF THE PUMP. BE SURE OF THIS! Read and understand the minimum wall thickness chart in the appendix section of this manual.



5.38  **ATTENZIONE !**

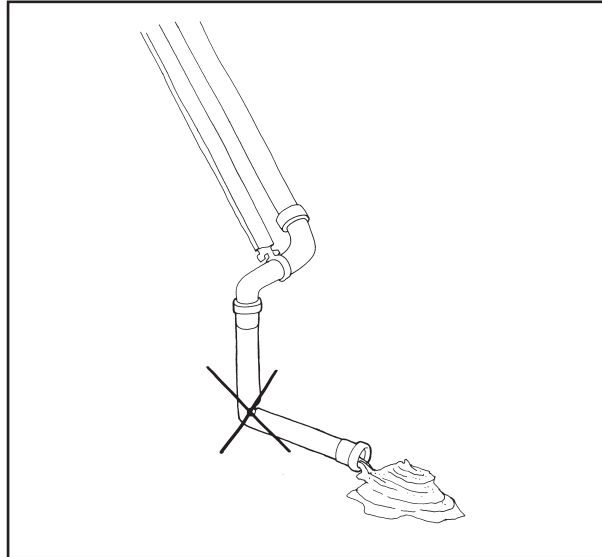
PIPELINES, END HOSES, COUPLINGS, ETC.

MUST BE IN GOOD CONDITION TO BE USED. Concrete pipeline system is subject to wear, which is affected by pumping pressure, concrete composition, pipeline material, etc. Read and understand the minimum wall thickness chart in the appendix section of this manual.

5.39  **ATTENZIONE !**

**DAMAGED CONCRETE PIPE SHOULD BE REPLACED, NOT REPAIRED. BURSTING PIPES AND CONCRETE ESCAPING UNDER PRESSURE CAN CAUSE SERIOUS INJURY OR DEATH!**

5.40 WHEN LAYING OUT PIPELINE AND A BEND (change of direction) MUST BE MADE, DO NOT USE A FLEXIBLE HOSE IN PLACE OF AN ELBOW!



- 5.41 Always use the largest diameter pipeline that is practical, and use steel pipe instead of rubber hose. This will keep the pressure required to push the concrete to a minimum.
- 5.42 Do not use suspended sections of delivery pipeline. The clamps and ends of the pipe are not meant to be structural support. Either an US~ transition pipe should be used to bring the pipe to ground level, or EACH SECTION OF THE PIPELINE SHOULD BE SUPPORTED at the pump outlet level. EACH SECTION OF PIPE MUST BE SUPPORTED BY SOMETHING CAPABLE OF HANDLING THE WEIGHT.
- 5.43 In vertical runs, the weight of the vertical sections of pipe must be supported by a thrust block (often called a Udead man”). Each section of vertical run must be secured from lateral movement..
- 5.44 When pumping vertically, the sections of pipe nearest the pump will see the highest pressure and the greatest wear. Therefore you should instali only BRAND NEW, THICK WALLED PIPE IN THESE LOCATIONS. Read and understand the minimum wall thickness chart in the appendix section of this manual.



**5.45 WARNING !**

The MAXIMUM CONCRETE PRESSURE of the pump MUST determine what thickness of pipe and what type of ends are needed. THE LENGTH OF THE SYSTEM OR QUALITY OF THE MIX MAY NOT BE USED TO DETERMINE THE TYPE OF ENDS USED, OR THE WALL THICKNESS OF THE PIPE USED, BECAUSE A ROCK JAM OR OTHER BLOCKAGE WILL CAUSE MAXIMUM PRESSURE TO BE APPLIED. GROOVED (Victaulic) ENDS ARE NOT RECOMMENDED! Read and understand the comparison between heavy duty raised, metric, and grooved ends in the appendix section of this manual.

- 5.46 If the pipeline remains on the job (as is the case when pumping a high rise building), THE OPERATOR IS RESPONSIBLE FOR CHECKING THE PIPELINE FOR DENTS, CRACKS, WEAR, AND CONTINUITY EACH DAY BEFORE THE POUR BEGINS.
- 5.47 If you will be unable to see the end of your pipeline, establish a system of communications with the workmen that will be at the point of discharge. AGREE ON HAND SIGNALS BEFORE THE POUR BEGINS!

**5.48**  **WARNING !**

ONCE THE MACHINE IS READY TO WORK, SECURE IT AGAINST UNAUTHORIZED USE! Either stay with the unit or make sure no one can start it without you. This would include locking the remote control box (cable or radio) in the cab of the truck.

5.49 In the case of separately laid pipeline, a safety area should be provided parallel to the pipeline. If this is not possible, cover the pipeline in a suitable fashion.

**5.50**  **WARNING !**

WATCH FOR CHILDREN! ONCE THE MACHINE HAS BEEN JACKED UP ON THE OUTRIGGERS IT IS VERY EASY FOR CHILDREN TO ACCESS THE SPACE UNDERNEATH THE MACHINE.

**5.51**  **WARNING !**

IF SPECTATORS WILL BE NEAR THE JOB, CORDON OFF AN AREA WHERE THEY WILL BE SAFE.



# SAFETY MANUAL

## Section B

### CONCRETE PUMP OPERATION



## B. CONCRETE PUMP OPERATIONUZZO

### 6 SAFETY RULES FOR PUMP OPERATORS

#### 6.1 WARNING !

ONLY QUALIFIED OPERATORS ARE ALLOWED TO OPERATE THE PUMP. A “Qualified Operator” is defined as someone that:

- a. has reached the age of 18 years, and
- b. is physically and mentally capable, and
- c. has been trained in the operation and maintenance of the pump and the placing boom (if applicable), and
- d. has demonstrated their capabilities to the company in respect to the operation and maintenance of the pump and placing boom, and
- e. can be expected to perform these duties, as assigned, in a reliable manner.

6.2 NOTE! Because the operator is responsible for the safety of all personnel in the operational area of the machine, it is crucial that he understands the proper operation of the machine and the safety rules that apply to the job at hand so that his course of action in unforeseen circumstances will be safe. Only thorough training and supervised job experience can supply the necessary understanding.

6.3 When operating the machine, wear PERSONAL PROTECTIVE CLOTHING. (Hard hat, safety shoes, goggles or safety glasses, ear protection, gloves, snug fitting clothes, etc.)

6.4 During operation, all covers, service flaps, etc. MUST BE CLOSED AND LOCKED.

#### 6.5 WARNING!

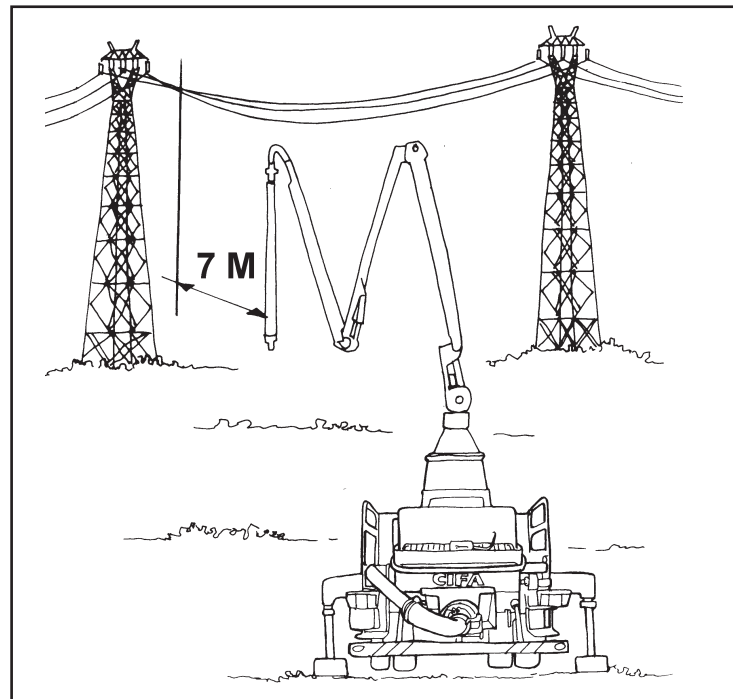
LIGHTNING HAZARD! IN THE EVENT OF A THUNDERSTORM, ESPECIALLY A THUNDERSTORM, THE OPERATOR MUST FOLD THE BOOM INTO THE TRANSPORT POSITION AND SEEK A SHELTERED AREA.

#### 6.6 WARNING !

IF YOUR DUTIES INCLUDE POSITIONING THE READY MIX TRUCKS AT THE PUMP YOU MUST REMEMBER THIS: NEVER, EVER POSITION YOURSELF BETWEEN A READY MIX TRUCK AND THE PUMP!

6.7  **WARNING !**

YOU MUST AVOID HAZARDOUS PROXIMITY OR CONTACT WITH POWER LINES UNDER ALL CIRCUMSTANCES. BE SURE THAT YOU MAINTAIN 17 FT. (5 METERS) CLEARANCE! YOU MUST TAKE INTO ACCOUNT THE MOVEMENT OF THE WIRES AND THE BOOM BY WIND FORCE, AS WELL AS HUMAN ERROR. DO NOT TAKE CHANCES WITH HIGH VOLTAGE!



6.8  **WARNING !**

DIRECT CONTACT WITH A LIVE POWER LINE IS ALWAYS DANGEROUS AND VERY PROBABLY DEADLY TO ANYONE ELECTRICALLY CONNECTED TO THE MACHINE.

6.9  **ATTENZIONE !**

THE PLACING BOOM, THE CONCRETE BEING PUMPED, THE CONCRETE IN THE HOPPER, THE MACHINE CHASSIS, REMOTE CONTROL CABLES, EVEN THE RUBBER TIP HOSE (steel braids), ARE ALL EXCELLENT CONDUCTORS OF ELECTRICITY. If the machine comes in contact with a live power line, ANYONE TOUCHING ANY PART OF THE MACHINE IS AT RISK!

**6.10**  **ATTENZIONE !**

DANGER OF LIFE! DO NOT RELY ON DEPTH PERCEPTION WHEN WORKING NEAR HIGH VOLTAGE LINES. PUT YOURSELF AT THE BEST POSSIBLE VANTAGE POINT TO SEE THE DISTANCE BETWEEN THE BOOM AND THE WIRES. If that is not possible, then YOU MUST USE A SPOTTER! See the definition of Uspottern in the glossary found in the appendix section of this manual.

**6.11**  **ATTENZIONE !**

REMEMBER TO WATCH FOR WIRES THAT ARE NOT DIRECTLY IN THE AREA OF THE POUR. ACCIDENTS HAPPEN WHEN MOVING BETWEEN POINTS OF PLACEMENT, OR WHEN MOVING THE BOOM AFTER THE POUR IS COMPLETED. NEVER LET DOWN YOUR GUARD WHEN THE BOOM IS IN THE AIR!

**6.12**  **ATTENZIONE !**

HIGH VOLTAGE WILL MAKE CONDUCTORS OUT OF MATERIALS THAT WOULD NORMALLY NOT CONDUCT! Wood, paper, fiberglass, nylon, tires, EVEN DIRT will conduct current from the 8000 volts to ground that is normally found in residential areas in the United States

**6.13**  **ATTENZIONE !**

DANGER OF HEARING LOSS! While standing near a working concrete pump, sound pressure levels may exceed Use and maintenance handbook standards for constant exposure.

**6.14**  **ATTENZIONE !**

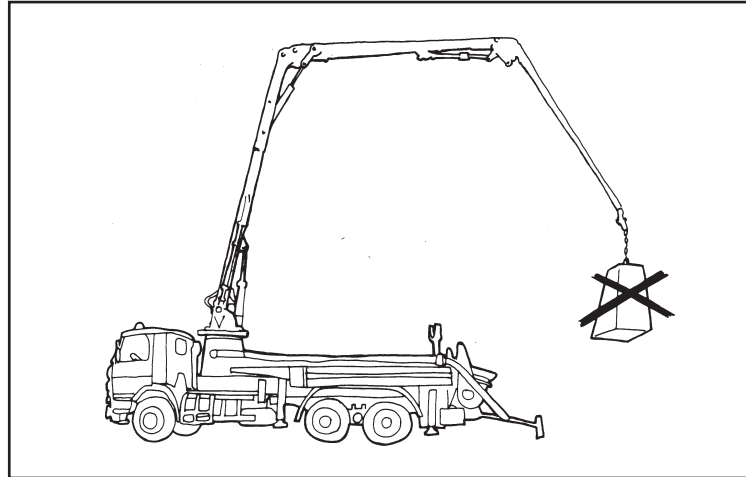
WHILE IN OPERATION, THE OPERATOR IS RESPONSIBLE FOR SAFETY IN THE OPERATIONAL AREA OF THE MACHINE.

**6.15**  **ATTENZIONE !**

DO NOT ALLOW UNAUTHORIZED PERSONS IN THE OPERATIONAL AREA OF THE PUMP AND BOOM. Warn persons present in the area to leave and stop work if they do not comply.

6.16  **ATTENZIONE !**

DO NOT USE THE BOOM AS A HOIST OR CRANE!



6.17  **ATTENZIONE !**

A BULK DENSITY OF APPROX. 150 POUNDS PER CUBIC FOOT IS ASSUMED FOR THE MATERIAL TO BE PUMPED WITH A PLACING BOOM. (Normal concrete). If you intend to pump material with a higher bulk density (e.g., steel fiber entrained concrete) YOU MUST CONTACT THE MANUFACTURER. FAILURE TO DO SO MAY RESULT IN DAMAGE TO THE BOOM AND/OR INSTABILITY IN CERTAIN OPERATING POSITIONS.

6.18  **ATTENZIONE !**

BLOCKAGES IN THE PUMP OR DELIVERY PIPELINE CAN CREATE AN UNSAFE CONDITION. Blockages can be caused by many different circumstances, ranging from poor mix design to old concrete to an inexperienced placing crew. CAUSES OF BLOCKAGES:

**A. FAULTY CONCRETE MIX DESIGN.** The concrete that is being supplied may not be a pumpable mix, for example there may be too much sand or too little cement. There may be bleeding or segregation. Some admixtures adversely affect pumpability (e.g., too much air entrainment). If the mix is not pumpable, no amount of operator expertise will make it so.



**B. PIPELINE AND JOINT DEFICIENCIES.** This would include dirty pipes (pipes that have not been cleaned properly), worn and leaking pipe joints which allow loss of concrete fines and water, pipes which haven't been properly primed before starting, and too many sections of rubber hose, which will increase friction. These are all causes of blockages that can be controlled by the operator.

**C. PUMP INADEQUATE FOR THE APPLICATION.** The pump selected for the job may not have enough pressure or horsepower available for the required duty

**D. CONCRETE SETTING UP IN THE PIPELINE.** This may be caused by delays on site (e.g., repairing a broken form), or by attempting to pump "old" concrete (concrete that was batched hours before pumping and is being kept alive only by adding water and constant agitation). Weather conditions can also affect how quickly the concrete becomes hard. Companies should establish procedures for these situations. A good rule of thumb is: IF IN DOUBT...WASH OUT

**E. FOREIGN MATTER IN THE CONCRETE.** Pieces of old concrete that break away from mixer fins, unmixed clumps of cement, mixer fins, hammers, and furry mammals are examples of foreign matter that have caused blockages.

**F. AN INEXPERIENCED OPERATOR CAN CAUSE BLOCKAGES BY SETTING UP THE JOB IMPROPERLY.** For example, if the placing crew is forced to add hose or pipe to reach a far point after the pour is already in progress, there is a great chance of creating a blockage due to the dry conditions inside the pipe or hose. It is for this reason that the job should be set up so pipe or hose need only be removed (never added) as the day progresses.

**G. AN INEXPERIENCED PLACING CREW CAN CAUSE BLOCKAGES BY KINKING THE END HOSE.** This type of blockage can lead to serious accidents because the hose may un-kink by the force of the pump.

**H. THE CONCRETE BECOMES SEGREGATED IN THE HOPPER.** In hard rains the cement and fine material get washed from the stone and coarse sand. This mix will not pump. It is also for this reason that you should NEVER ALLOW A TRUCK MIXER TO WASH OUT IN YOUR HOPPER!.

**6.19**  **ATTENZIONE !**

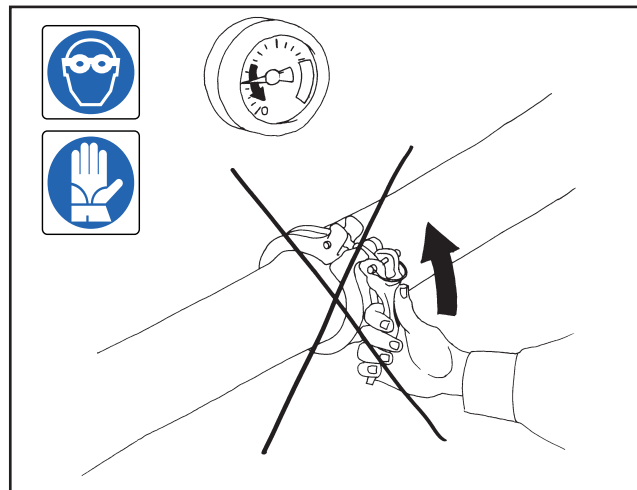
NEVER TRY TO REMOVE A PIPELINE BLOCKAGE BY APPLYING HIGH PRESSURE TO IT. If “rocking” the concrete back and forth with the forward/reverse function doesn’t break it loose, it will have to be removed manually. WEAR PERSONAL SAFETY APPAREL WHEN OPENING A BLOCKED PIPELINE. CLEAR THE AREA OF PERSONNEL BEFORE OPENING THE LINE.

**6.20**  **ATTENZIONE !**

NEVER USE COMPRESSED AIR TO CLEAR A BLOCKAGE! IT IS UNSAFE AND UNNECESSARY. If the pump pressure can’t move it, air pressure won’t either.

**6.21**  **ATTENZIONE !**

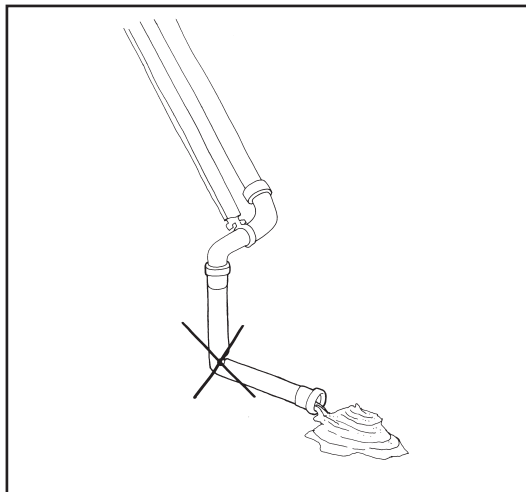
NEVER OPEN PIPELINE CONNECTIONS WHEN THE SYSTEM IS PRESSURIZED. YOU MUST FIRST RELIEVE THE PRESSURE FROM THE SYSTEM BY PUTTING THE PUMP IN THE “REVERSE” MODE FOR SEVERAL STROKES



6.22

**ATTENZIONE !**

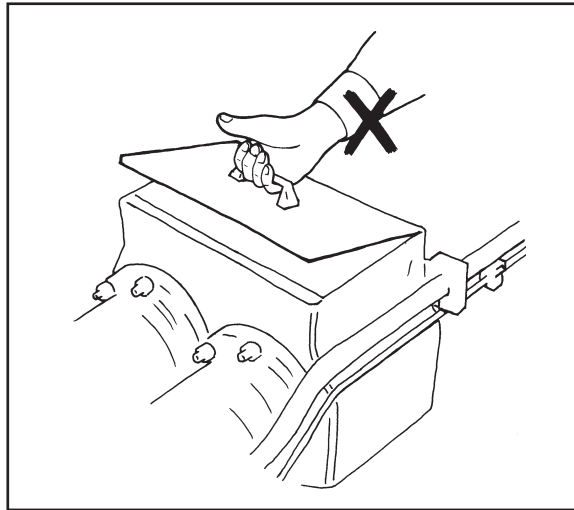
THE END HOSE(S) MUST NEVER BE KINKED DURINO PUMPING OPERATIONS. KINKING WILL CAUSE THE PUMP TO CREATE MAXIMUM CONCRETE PRESSURE. IF THE PUMP IS STRONG ENOUGH (equipped with enough horsepower), IT MAY UNKINK THE HOSE WITH FORCE!



6.23 CLOSELY MONITOR THE PLACING CREW. IF THEY ARE CAUSING AN UNSAFE CONDITION (e.g., kinking the hoses at the point of discharge) YOU MUST STOP PUMPING AND INFORM THE SITE MANAGEMENT. REMEMBER, THE OPERATOR IS RESPONSIBLE FOR SAFETY IN THE OPERATIONAL AREA OF THE MACHINE! Although it may be the hose man's error, it will be YOUR accident!

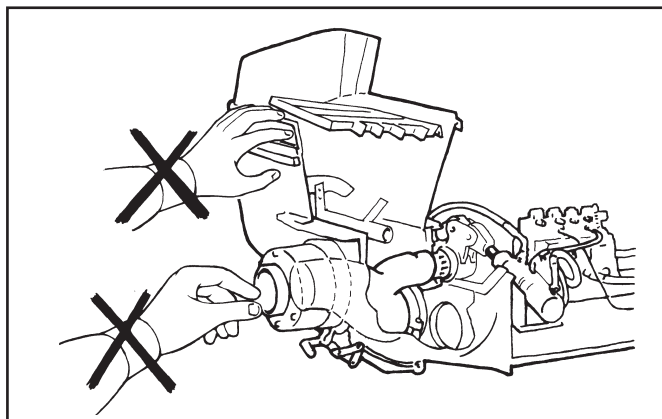
6.24  **ATTENZIONE !**

DANGER OF CRUSHING! DO NOT REMOVE THE WATER BOX COVERS WHEN THE PUMP IS IN OPERATION. If you must remove the covers to add water or check the water level or condition, you must first stop the pump.



6.25  **ATTENZIONE !**

DANGER OF CRUSHING! NEVER PUT YOUR HANDS, FEET, OR ANY OTHER BODY PART INTO THE WATER BOX, CONCRETE VALVE, OR HOPPER WHEN THE HYDRAULIC SYSTEM IS OPERATIONAL OR READY TO OPERATE!



6.26  **ATTENZIONE !**

DO NOT ATTEMPT ANY WORK ON THE HOPPER, WATER BOX, OR CONCRETE VALVE UNLESS THE DRIVE ENGINE IS TURNED OFF AND THE ACCUMULATOR PRESSURE (if so equipped) HAS BEEN RELEASED! ON UNITS WITH INTERNAL COMBUSTION ENGINES, THE KEY MUST BE REMOVED. ON UNITS DRIVEN BY ELECTRIC MOTORS, THE MAIN DISCONNECT MUST BE LOCKED OUT AND TAGGED

6.27  **ATTENZIONE !**

DO NOT OPERATE THE MACHINE UNLESS THE HOPPER GRATE IS BOLTED FIRMLY IN PLACE. NEVER STAND ON THE HOPPER GRATE!

6.28  **ATTENZIONE !**

IF THE PUMP OR ASSOCIATED EQUIPMENT DEVELOPS A PROBLEM WHICH CREATES AN UNSAFE CONDITION, YOU MUST STOP PUMPING IMMEDIATELY! PUMPING MUST NOT RESTART UNTIL THE PROBLEM HAS BEEN PROPERLY RECTIFIED.

6.29  **ATTENZIONE !**

NEVER OPERATE THE BOOM "BLIND". IF YOU CAN'T SEE THE POINT OF PLACEMENT, YOU MUST HAVE A "SPOTTER" TO GIVE YOU DIRECTIONS. AGREE ON HAND SIGNALS OR OTHER METHODS OF COMMUNICATION BEFORE STARTING THE PUMP!

6.30  **ATTENZIONE !**

NEVER LEAVE THE PUMP UNATTENDED WHILE IT IS IN USE!

6.31  **ATTENZIONE !**

THE CONCRETE HOPPER MUST ALWAYS BE FILLED TO THE LEVEL OF THE AGITATOR SHAFT IN ORDER TO PREVENT EXPULSION OF THE CONCRETE DUE TO COMPRESSED AIR.

**6.32**  **ATTENZIONE !**

TO PREVENT ANY UNINTENTIONAL MOVEMENTS OF THE MACHINE, ALL CONTROL DEVICES ON THE OPERATOR'S PANEL AND THE REMOTE CONTROL BOX MUST BE SWITCHED OFF BEFORE CHANGING FROM REMOTE CONTROL TO LOCAL CONTROL, OR VICE VERSA. WHENEVER YOU ARE CONNECTING OR DISCONNECTING THE REMOTE CABLE, PUSH IN THE EMERGENCY STOP BUTTON.

**6.33**  **ATTENZIONE !**

WHENEVER WORK IS INTERRUPTED, SECURE THE MACHINE AGAINST UNAUTHORIZED USE. This includes locking the remote box in the cab.

**6.34**  **ATTENZIONE !**

ALWAYS USE A BLANKING PLUG OR EQUIVALENT WHEN YOU MUST SWING A FULL BOOM OVER WORKMEN OR PROPERTY. Always use a safety cable or sling to secure the blanking plug to the end of the delivery line, and pin the clamp that holds the blanking plug in place.

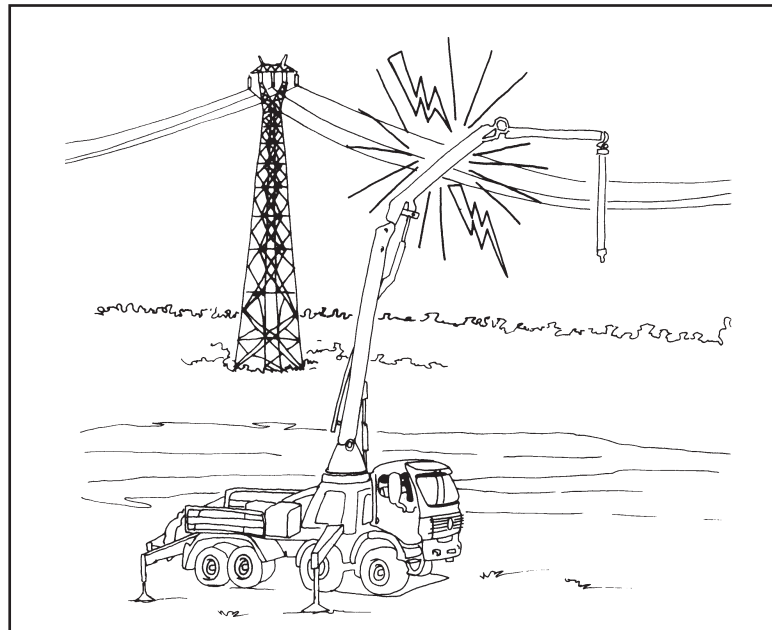
## 7 SAFETY RULES for OILERS or LABORERS assigned to work at the pump.

### 7.1 ATTENZIONE !

YOU SHOULD WEAR THE SAME PERSONAL SAFETY EQUIPMENT AS THE OPERATOR. Goggles, hard hat, ear protection, and rubber gloves are especially important when working near the hopper.

### 7.2 ATTENZIONE !

DANGER OF LIFE! YOU MUST BE AWARE THAT IF THE UNIT BECOMES ENERGIZED WITH HIGH VOLTAGE AND YOU ARE IN CONTACT WITH ANY PART OF IT, YOU WILL BE AT RISK OF ELECTROCUTION! YOU SHOULD MONITOR THE MOVEMENT OF THE BOOM AND ALERT THE OPERATOR IF HE IS NEARING ANY DANGER.



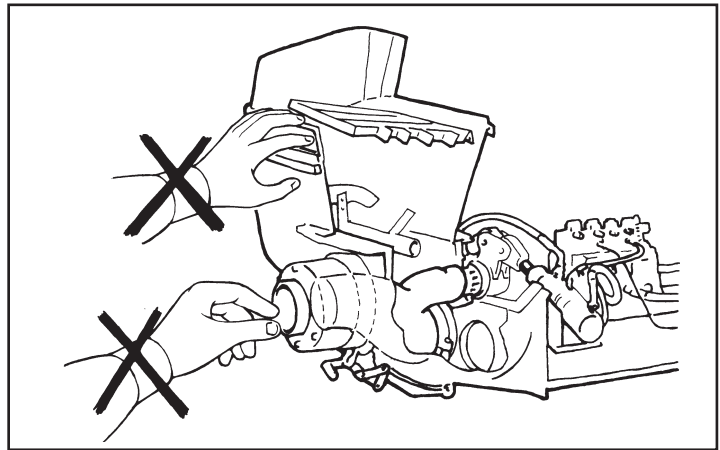
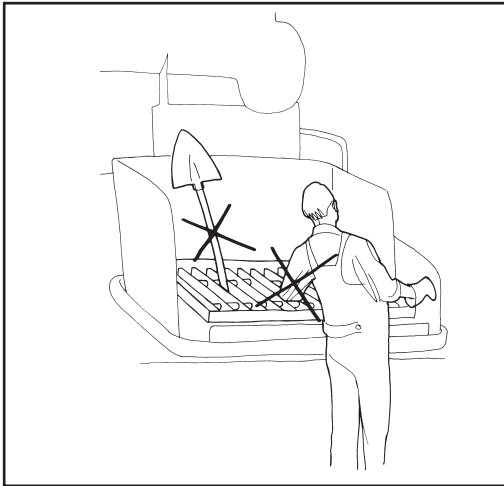
**DANGER!** IF THE PUMP BECOMES ENERGIZED, ANYONE OR ANYTHING THAT IS ELECTRICALLY CONNECTED TO THE PUMP WILL ALSO BE ENERGIZED! HIGH VOLTAGE MAKES CONDUCTORS OUT OF MATERIALS THAT WOULD NORMALLY NOT CONDUCT!  
**USE EXTREME CAUTION AROUND HIGH VOLTAGE!**

### 7.3 ATTENZIONE !

IF YOUR DUTIES INCLUDE POSITIONING THE READY MIX TRUCKS AT THE PUMP YOU MUST REMEMBER THIS: NEVER, EVER POSITION YOURSELF BETWEEN A READY MIX TRUCK AND THE PUMP!

7.4  **ATTENZIONE !**

DANGER OF CRUSHING! NEVER PUT YOUR HANDS, FEET, OR ANY OTHER BODY PART INTO THE WATER BOX, CONCRETE VALVE, OR HOPPER WHEN THE HYDRAULIC SYSTEM IS READY TO OPERATE!



7.5  **ATTENZIONE !**

NEVER STAND ON THE HOPPER GRATE!

7.6  **ATTENZIONE !**

IF YOU DISCOVER A PROBLEM WITH THE MACHINE THAT COULD CREATE AN UNSAFE CONDITION, IMMEDIATELY INFORM THE OPERATOR.

7.7  **ATTENZIONE !**

WHEN GREASING THE AGITATOR BEARINGS OR CONCRETE VALVE LUBRICATION POINTS, YOU MUST KEEP YOUR HANDS, FEET AND HEAD CLEAR OF MOVING PARTS! TAKE NO CHANCES!

7.8  **ATTENZIONE !**

YOU MUST NOT OPERATE THE PUMP OR BOOM UNLESS YOU ARE ALSO A QUALIFIED OPERATOR (See the definition of "Qualified Operator" in section 6.1 of the General Rules section of this safety manual) AND THE NORMAL OPERATOR HAS RELEASED HIS RESPONSIBILITIES TO YOU.



7.9  **ATTENZIONE !**

WATCH FOR CHILDREN AND UNAUTHORIZED PERSONNEL IN THE OPERATIONAL AREA. WARN PERSONS PRESENT IN THE OPERATION AREA TO LEAVE. IF THEY DO NOT LEAVE, IMMEDIATELY INFORM THE OPERATOR.

7.10  **ATTENZIONE !**

DANGER OF HEARING LOSS! While standing near a working concrete pump, sound pressure levels may exceed Use and maintenance handbook standards for constant exposure.

7.11  **ATTENZIONE !**

WHEN MOUNTING OR DISMOUNTING THE UNIT YOU SHOULD ALWAYS OBEY THE "3 POINT RULE" (Keep one hand and two feet or two hands and one foot in contact with a secure surface at all times).

7.12 KEEP THE DECKS AND STEPS OF THE MACHINE CLEAN. REMOVE MUD, ICE, SNOW AND DIRT FROM THE UNIT BEFORE ATTEMPTING TO MOUNT OR DISMOUNT IT.

7.13  **ATTENZIONE !**

WHEN CLEANING THE MACHINE, BE CAREFUL NOT TO SPRAY ELECTRICAL COMPONENTS DIRECTLY. ALTHOUGH THEY ARE NORMALLY MOUNTED IN AN ENCLOSURE, THEY ARE USUALLY SPLASH PROOF, NOT WATERPROOF.

7.14  **ATTENZIONE !**

NOTICE THE LEVEL OF CONCRETE IN THE HOPPER. ADVISE THE READY MIX DRIVER NOT TO ALLOW THE LEVEL OF CONCRETE TO GO BELOW THE AGITATOR SHAFT. IF THE LEVEL IS ALLOWED TO BECOME SO LOW THAT AIR IS SUCKED INTO THE CYLINDERS THERE WILL BE EXPULSION OF CONCRETE FROM THE HOPPER DUE TO COMPRESSION OF THE AIR

7.15 IF YOU SEE FOREIGN MATERIAL (WHICH COULD CREATE A BLOCKAGE) COMING FROM THE READY MIX TRUCK, ALERT THE OPERATOR TO STOP THE PUMP. DO NOT ATTEMPT TO REMOVE THE MATERIAL FROM THE HOPPER OR GRATE WHILE THE HYDRAULIC SYSTEM IS READY TO WORK.

**7.16**  **ATTENZIONE !**

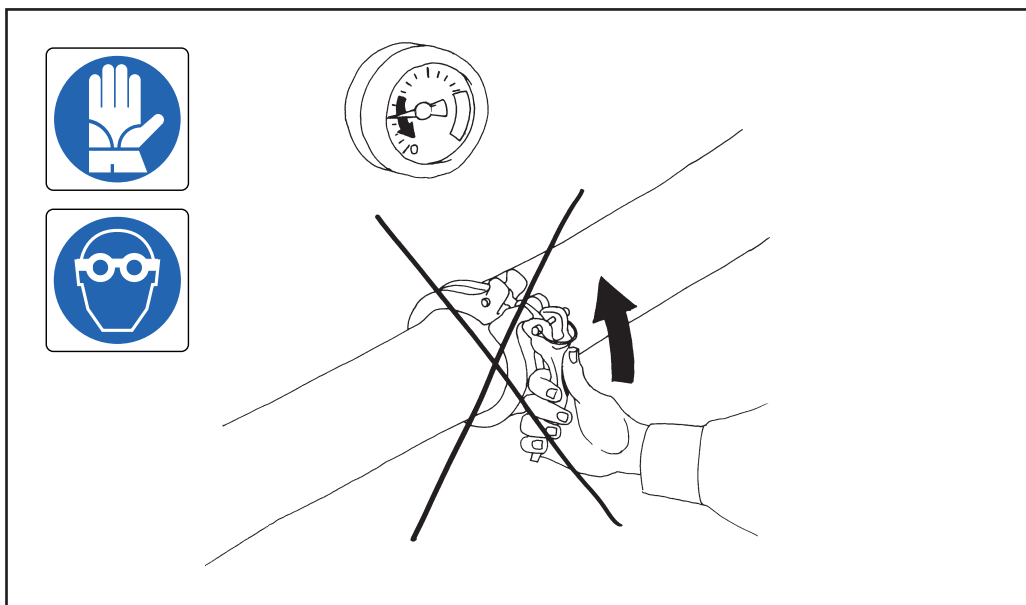
DANGER OF BLOCKAGE! NEVER ALLOW THE READY MIX DRIVER TO CLEAN OUT IN THE HOPPER! (Water will wash the cement and fine sand from the coarse aggregate causing segregation).

**7.17**  **ATTENZIONE !**

NEVER USE COMPRESSED AIR TO CLEAR A BLOCKAGE! IT IS UNSAFE AND UNNECESSARY. If the pump pressure can't move it, air pressure won't either.

**7.18**  **ATTENZIONE !**

DANGER OF SEVERE INJURY! NEVER OPEN A PIPELINE THAT IS UNDER PRESSURE

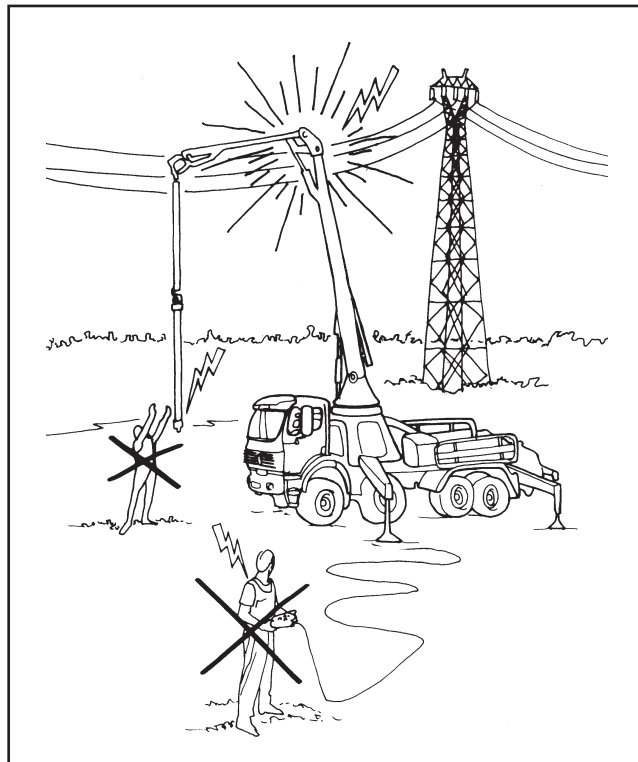


**7.19** BE CAREFUL WHEN HANDLING PIPELINE OR ANY OTHER HEAVY OBJECT. LEARN HOW TO LIFT WITHOUT USING YOUR BACK. GET ASSISTANCE IF NEEDED.

## 8 SAFETYRULES FOR THE PLACING CREW.

### 8.1 ATTENZIONE !

DANGER OF LIFE! YOU MUST BE AWARE THAT IF THE UNIT BECOMES ENERGIZED WITH HIGH VOLTAGE AND YOU ARE IN CONTACT WITH ANY PART OF IT, YOU WILL BE AT RISK OF ELECTROCUTION! YOU SHOULD MONITOR THE MOVEMENT OF THE BOOM AND ALERT THE OPERATOR IF HE IS NEARING ANY DANGER.



**DANGER!** IF THE PUMP BECOMES ENERGIZED, ANYONE OR ANYTHING THAT IS ELECTRICALLY CONNECTED TO THE PUMP WILL ALSO BE ENERGIZED! HIGH VOLTAGE MAKES CONDUCTORS OUT OF MATERIALS THAT WOULD NORMALLY NOT CONDUCT! **USE EXTREME CAUTION** AROUND HIGH VOLTAGE!

### 8.2 ATTENZIONE !

WEAR PERSONAL PROTECTIVE CLOTHING WHEN WORKING AROUND A CONCRETE PUMP. MINIMUM PROTECTION INCLUDES A HARD HAT, SAFETY GOGGLES OR FACE SHIELD, STEELTOED WORK SHOES, AND GLOVES THAT WILL RESIST CONCRETE LIME BURNS. IF YOU WILL BE WORKING IN THE CONCRETE YOU MUST ALSO PROTECT YOUR FEET AND HANDS WITH RUBBER BOOTS AND GLOVES!

**8.3**  **ATTENZIONE !**

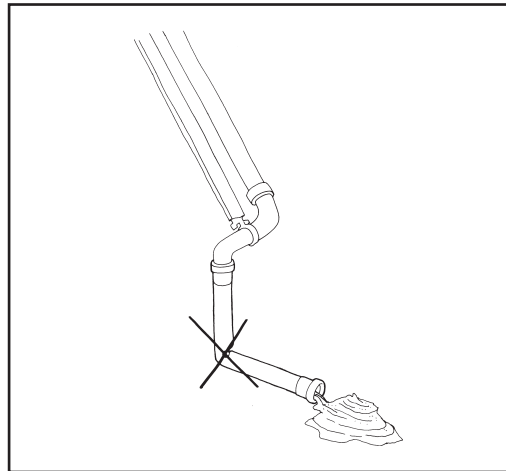
DANGER OF CRUSHING! NEVER POSITION YOUR HANDS OR ANY BODY PART BETWEEN THE END OF THE DELIVERY SYSTEM AND A FIXED OBJECT. (e.g., Between the tip hose and the concrete form).

**8.4**  **ATTENZIONE !**

DANGER OF FALLING! WHEN POURING COLUMNS, SLABS OR WALLS ABOVE GROUND, SECURE YOURSELF FROM FALLING.

**8.5**  **ATTENZIONE !**

DANGER OF LIFE! DO NOT KINK THE END HOSE(S)! THIS WILL CREATE MAXIMUM PRESSURE ON THE CONCRETE. IF THE UNIT IS STRONG ENOUGH (equipped with enough horsepower), IT MAY UNKINK THE HOSE BY FORCE!

**8.6**  **ATTENZIONE !**

DO NOT SIT OR STAND ON A PIPE OR HOSE. NEVER STRADDLE A PIPE OR HOSE. NEVER TRY TO SUPPORT THE WEIGHT OF THE CONCRETE END HOSE ON YOUR BACK OR SHOULDERS.

**8.7**  **ATTENZIONE !**

AVOID STANDING DIRECTLY UNDER OR OVER THE BOOM OR THE SYSTEM PIPELINE. THE CONCRETE IS BEING MOVED BY PRESSURE AND FAILURE OF A PIPE, CLAMP, HOSE, OR ELBOW IS POSSIBLE!

8.8 AFTER REMOVING PIPE SECTIONS YOU MUST RE-ASSEMBLE USING GASKETS AND CLAMPS. Pipelines assembled without gaskets will leak cement and water, which can cause a blockage.

8.9  **ATTENZIONE !**

WHEN THE PUMP CREW IS USING COMPRESSED AIR TO CLEAN THE BOOM OR SYSTEM PIPELINE, STAY AWAY FROM THE DISCHARGE AREA. NEVER TRY TO HOLD DOWN A PIPE OR HOSE THAT IS BEING CLEANED WITH AIR.

8.10  **ATTENZIONE !**

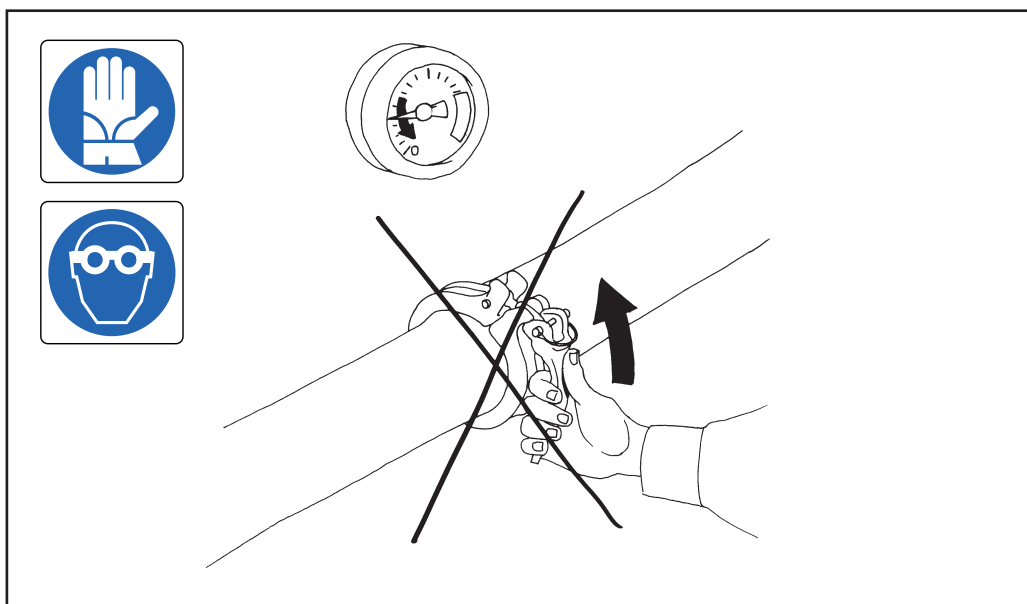
NEVER, EVER LOOK INTO THE END OF A HOSE OR PIPE THAT IS PLUGGED!

8.11  **ATTENZIONE !**

NEVER USE COMPRESSED AIR TO CLEAR A BLOCKAGE! IT IS UNSAFE AND UNNECESSARY. If the pump pressure can't move it, air pressure won't either.

8.12  **ATTENZIONE !**

DANGER OF SEVERE INJURY! NEVER OPEN A PIPELINE THAT IS UNDER PRESSURE.





# SAFETY MANUAL

## Section C

### CLEANING THE PUMP AND SYSTEM



## C. CLEANING THE PUMP AND SYSTEM

### 9 SAFETY RULES for CLEANING THE BOOM

9.1  **ATTENZIONE !**

DO NOT LET DOWN YOUR GUARD WHEN THE POUR IS COMPLETED. ACCIDENTS CAN OCCUR DURING CLEANOUT AND THE DRIVE BACK TO THE YARD. IT IS IMPORTANT NOT TO BECOME RELAXED ABOUT JOB SAFETY UNTIL YOU ARE NO LONGER ON THE JOB.

9.2  **ATTENZIONE !**

WATCH FOR ELECTRIC WIRES WHEN MOVING THE BOOM FOR CLEANOUT OR FOLDING THE BOOM FOR TRANSPORT!

9.3  **ATTENZIONE !**

IMPROPER PROCEDURES WHEN USING COMPRESSED AIR TO CLEAN THE BOOM CAN BE DANGEROUS. You should first try sucking back the ball or clearing with water, which is not compressible.

9.4  **ATTENZIONE !**

IF YOU HAVE TO USE COMPRESSED AIR FOR CLEANING THE BOOM YOU MUST HAVE ALL OF THE NECESSARY ACCESSORIES. IF YOU FIND THAT YOU DO NOT HAVE ALL OF THE NECESSARY ACCESSORIES, YOU SHOULD DISMANTLE THE PIPELINE AND CLEAN IT MANUALLY WITHOUT AIR. BE SURE YOU READ AND UNDERSTAND THE COMPLETE SAFETY RULES REGARDING CLEANING OUT WITH COMPRESSED AIR STARTING AT SECTION 12.4 OF THE GENERAL RULES SECTION OF THIS SAFETY MANUAL.

9.5  **ATTENZIONE !**

NEVER USE COMPRESSED AIR TO BLOW THROUGH RUBBER HOSES OR SHORT SECTIONS OF PIPE. In the case of rubber hoses, their flexibility will allow them to “whip” wildly with the force of the air and moving concrete. Short sections of pipe will not have sufficient mass to allow the concrete to move slowly, so there will be rapid expulsion of the material!

9.6  **ATTENZIONE !**

IF THE BALL OR GO DEVII WILL NOT COME OUT OF THE BOOM PIPE OR SEPARATELY LAID PIPELINE AFTER APPLYING COMPRESSED AIR, YOU MUST RELIEVE THE PIPE OF AIR PRESSURE BEFORE OPENING IT.

9.7  **CAUTION!**

Exercise care when “tapping” on the pipeline to find the location of the cleanout ball. Applying too much force will dent a standard pipe (making it unusable) and in the case of super pipe can break the carbide insert.



## 10 SAFETY RULES for CLEANING the CONCRETE VALVE & HOPPER

### 10.1 ATTENZIONE !

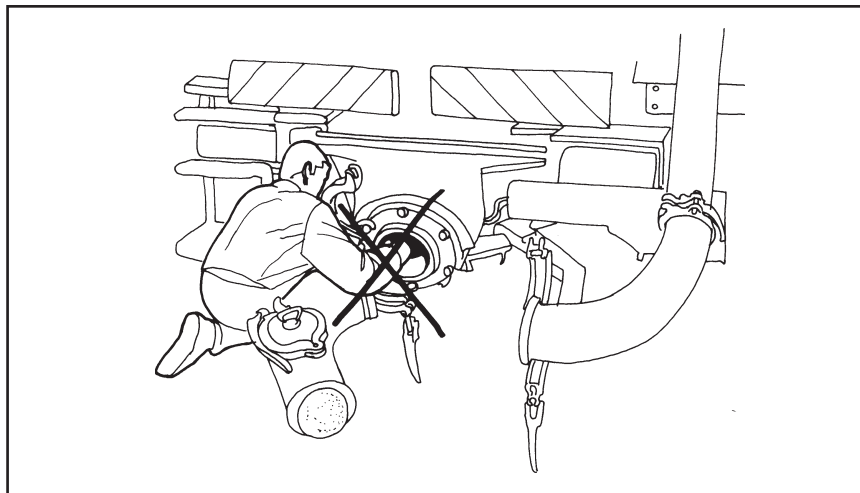
DANGER OF TIPPING! IF YOU HAVE TO CHANGE LOCATIONS BEFORE CLEANING THE CONCRETE VALVE, YOU MUST FIRST STOW THE BOOM IN THE TRAVELING POSITION.

### 10.2 ATTENZIONE !

WEAR PERSONAL PROTECTIVE CLOTHING WHEN CLEANING THE CONCRETE PUMP. YOU WILL BE WORKING IN THE CONCRETE SO IN ADDITION TO YOUR NORMAL SAFETY APPAREL, YOU MUST PROTECT YOUR FEET AND HANDS WITH RUBBER BOOTS AND GLOVES!

### 10.3 ATTENZIONE !

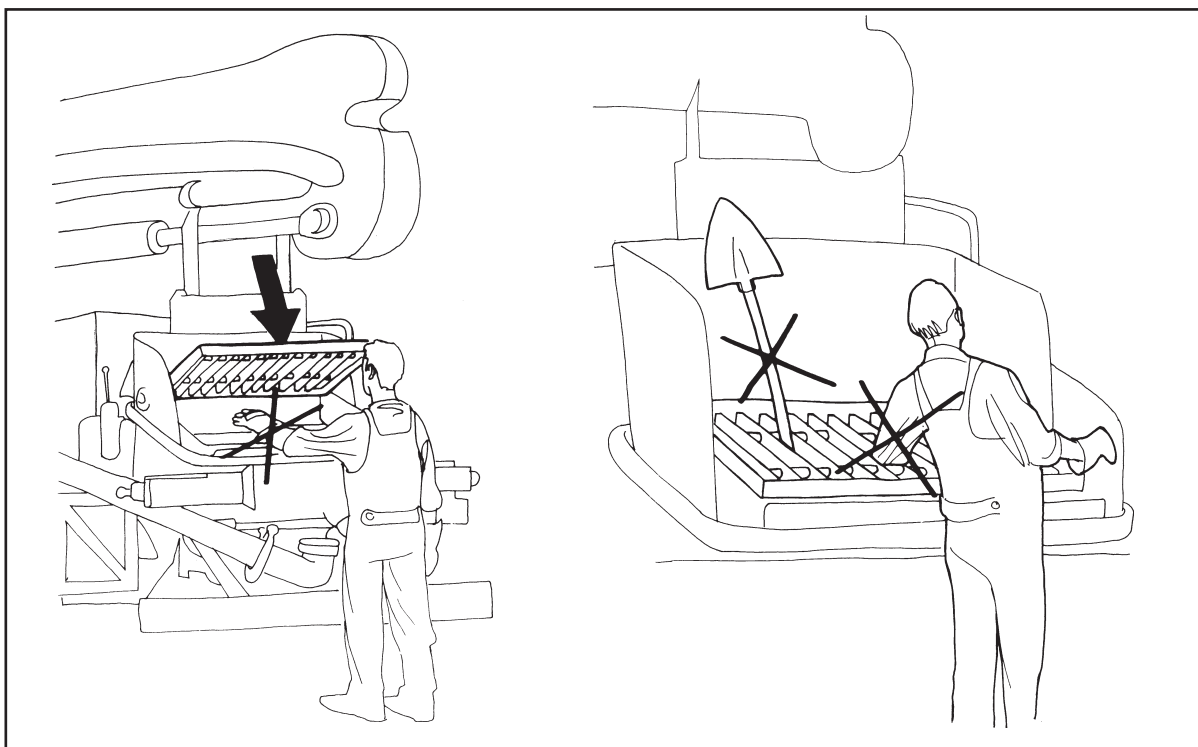
DANGER OF AMPUTATION! NEVER, EVER PUT YOUR HANDS OR ANY OTHER BODY PART INTO THE CONCRETE VALVE. INSTEAD USE WATER JETS AND THE SUPPLIED RAKE.



10.4

**ATTENZIONE !**

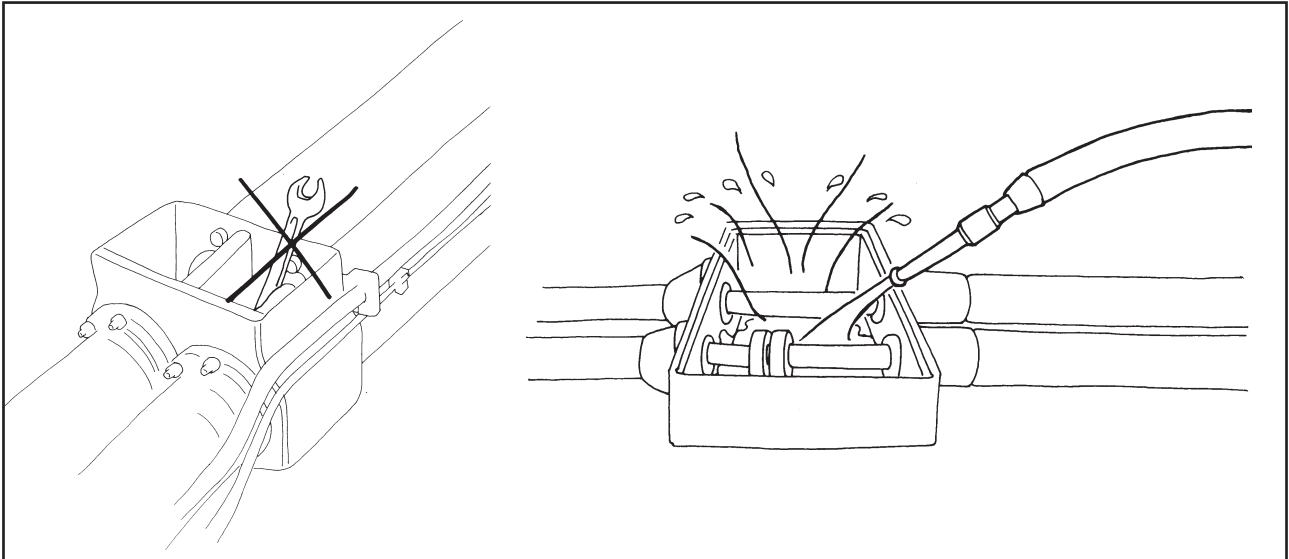
NEVER PUT YOUR HANDS OR ANY OTHER BODY PART INTO THE HOPPER WHEN THE HYDRAULIC SYSTEM IS OPERATIONAL. IF YOU MUST REMOVE THE GRATE TO CHIP AT HARDENED CONCRETE, YOU MUST FIRST DISABLE THE SYSTEM BY STOPPING THE ENGINE OR ELECTRIC MOTOR, RELIEVING PRESSURE IN THE ACCUMULATOR CIRCUIT (if so equipped) AND LOCKING THE CONTROLS. REINSTALL THE GRATE BEFORE RESTARTING THE ENGINE. TAKE NO CHANCES!



## 11 SAFETYRULES for CLEANING THE WATER BOXA

### 11.1 ATTENZIONE !

CLEAN THE WATER BOX WITH WATER JETS ONLY. THERE IS NO REASON TO PUT YOUR HANDS OR ANY OTHER BODY PART INTO THE WATER BOX FOR CLEANING.



### 11.2 ATTENZIONE !

STOP THE CONCRETE PUMP BEFORE REMOVING THE WATER BOX COVERS FOR ANY REASON.

### 11.3 ATTENZIONE !

IF POSSIBLE, POSITION THE FOLDED BOOM IN A SLIGHTLY RAISED POSITION WHEN CLEANING THE WATER BOX. THIS WAY, IT WILL BE UNNECESSARY TO BEND OVER THE WATER BOX FOR CLEANING.

### 14.4 ATTENZIONE !

DANGER OF CRUSHING! NEVER, EVER PUT YOUR HANDS OR ANY OTHER BODY PART IN THE WATER BOX WHEN THE HYDRAULIC SYSTEM IS OPERATIONAL OR READY TO OPERATE.

### 11.5 ATTENZIONE !

BE SURE OF YOUR FOOTING WHEN CLEANING THE WATER BOX.

## 12 SAFETY RULES FOR CLEANING A SEPARATELY LAID PIPELINE

### A. CLEANING A PIPELINE WITH WATER

12.1  **ATTENZIONE !**

BE SURE TO CLEAR THE DISCHARGE AREA OF PERSONNEL AND EQUIPMENT BEFORE WASHING THE PIPELINE WITH WATER. SOME AIR WILL BE TRAPPED IN THE PIPELINE, WHICH WILL BECOME COMPRESSED BEFORE DISCHARGE.

12.2  **ATTENZIONE !**

YOU MUST USE A BALL CATCHER AT THE POINT OF DISCHARGE, EVEN WHEN CLEANING WITH WATER.

### B CLEANING A PIPELINE WITH COMPRESSED AIR

12.3  **ATTENZIONE !**

NEVER USE COMPRESSED AIR TO CLEAR A BLOCKAGE! IT IS UNSAFE AND UNNECESSARY. If the pump pressure can't move it, air pressure won't either.

12.4  **ATTENZIONE !**

BLOWING OUT WITH COMPRESSED AIR IS POTENTIALLY DANGEROUS ! SERIOUS INJURY OR DEATH CAN RESULT IF YOU DO NOT ADHERE TO THESE SAFETY POINTS:

- A. BLOWING OUT MUST BE PERFORMED UNDER THE SUPERVISION OF AN EXPERT. (See the glossary for the definition of "expert").
- B. BLOWING OUT REQUIRES 2 PEOPLE! One trained person must be at the inlet end to operate the air insertion, the other trained person must be near (but safely back from) the discharge point to monitor that no personnel enters the danger area.
- C. NO PIPE BENDS OR HOSES MAY BE CONNECTED TO THE END OF THE PIPELINE DURING THE BLOWING OUT PROCESS.

- D. CLEAR THE DISCHARGE AREA OF PERSONNEL AND EQUIPMENT BEFORE BEGINNING THE BLOWING OUT PROCESS. DO NOT ALLOW ANYONE TO ENTER THE AREA WHEN BLOWING OUT IS IN PROGRESS.
- E. CATCH BASKET MUST BE INSTALLED ON THE OUTLET!
- F. THE CONCRETE OUTLET MUST BE POSITIONED HIGH ENOUGH TO PERMIT EASY DISCHARGE OF THE MATERIAL. IT IS PREFERRED THAT DISCHARGE IS DONE INTO THE DRUM OF A READY MIX TRUCK.
- G. THE PLUG OR GO DEVIL MUST BE LONG ENOUGH TO ENSURE AIR TIGHT SEALING OF THE PIPELINE AT THE CATCH BASKET WHEN THE CONCRETE HAS BEEN DISCHARGED.
- H. THE PIPE CLEANING BLOW OUT HEAD MUST BE EQUIPPED WITH A PRESSURE GAUGE AND A PROPERLY SIZED AIR REGULATOR VALVE.
- I. THE PLUG OR GO DEVIL MUST BE THICK ENOUGH TO PREVENT COMPRESSED AIR FLOW AROUND THE PLUG INTO THE CONCRETE.
- J. WORK AT OR DISASSEMBLY OF THE PIPELINE IS NOT ALLOWED UNTIL AFTER THE PIPELINE HAS BEEN COMPLETELY RELIEVED OF AIR. BE SURE OF THIS!
- K. DO NOT BLOW OUT CONCRETE DELIVERY HOSE, SINGLE PIPE SECTIONS AND SHORT PIPELINES UP TO A LENGTH OF 40 FEET. In the case of short pipe, the small mass will cause rapid expulsion of the material.
- L. WHEN AIR PRESSURE BEGINS TO DROP RAPIDLY (signaling that the pipeline is almost empty), SHUT OFF THE AIR SUPPLY FROM THE COMPRESSOR, AND IMMEDIATELY BEGIN BLEEDING AIR OUT OF THE PIPELINE

**12.5**  **ATTENZIONE !**

BLOWING OUT VERTICAL SECTIONS OF PIPE (for example on a high rise building) REQUIRES ADDITIONAL SAFETY PRECAUTIONS. BECAUSE GRAVITY WILL CAUSE THE CONCRETE TO MOVE DOWN A VERTICAL PIPELINE, THE FOLLOWING SAFETY RULES WILL ALSO APPLY:

- A. A SHUT OFF VALVE MUST BE INSTALLED IN THE CONCRETE DELIVERY LINE AT THE BOTTOM OF THE VERTICAL RUN. This shut off valve must be capable of handling the maximum concrete pressure of the pump, and of course, must be installed before the pour begins. Several different styles are available, ranging from a manually operated flat gate that is put into place with a hammer, to fully hydraulic types that will also divert the concrete to a different pipeline.
- B. KNOW WHERE THE DISCHARGE AREA FOR BLOWING OUT WILL BE BEFORE THE POUR BEGINS. If possible, install the ball catcher before the pour begins so you will not waste time when pumping is complete.
- C. WHEN PUMPING IS COMPLETED, YOU MUST CLOSE THE SHUT OFF VALVE BEFORE DISCONNECTING THE PIPELINE FROM THE PUMP. Failure to do this will cause the concrete to fall out of the vertical sections of pipe, leaving concrete in the horizontal sections of pipe, and an air pocket in the vertical sections.
- D. INSTALL THE BALL(S) IN THE PIPELINE, SECURE THE BLOW OUT HEAD AND GET THE AIR HOOKED UP. DO NOT TURN ON THE AIR YET!
- E. DIVERT THE VERTICAL PIPE LINE TO THE CLEAN OUT AREA. (Ball catcher MUST now be in place).
- F. OPEN THE SHUT OFF VALVE IN THE DELIVERY PIPE LINE.
- G. AFTER CLEARING THE DISCHARGE AREA OF PERSONNEL, YOU CAN APPLY THE COMPRESSED AIR TO THE BALL. ALL THE RULES FOR BLOWING OUT FOUND IN POINT "12.4" on page 60 ALSO APPLY TO BLOWING OUT A VERTICAL PIPE LINE. THESE RULES ARE IN ADDITION TO THE GENERAL "CLEANING A PIPELINE WITH COMPRESSED AIR" RULES.

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# SAFETY MANUAL

## Section D

### MAINTENANCE

### OF THE MACHINERY





## D. MAINTENANCE OF THE MACHINERY

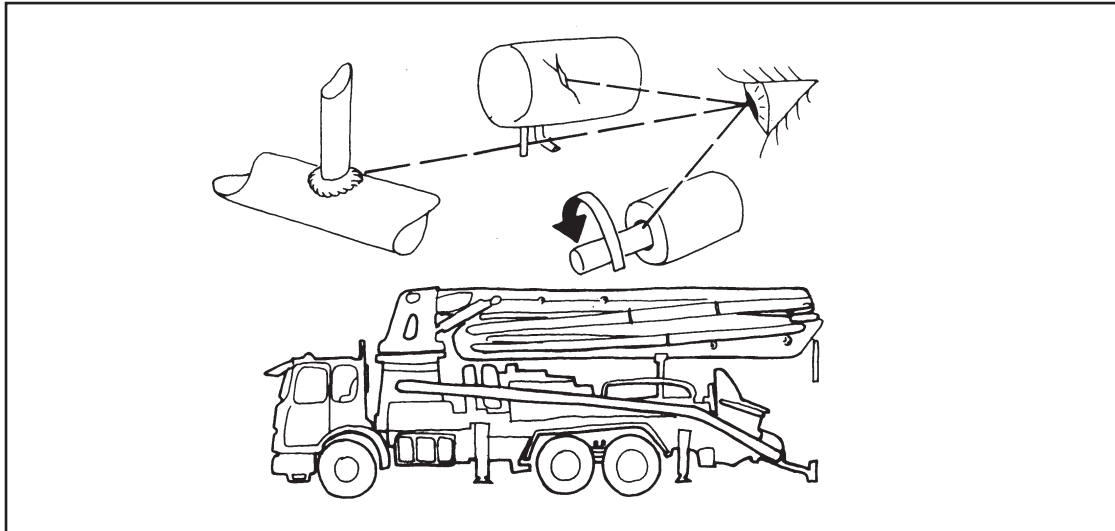
### 13 SAFETY RULES REGARDING INSPECTION

#### 13.1 ATTENZIONE !






IT IS IMPERATIVE THAT YOUR BOOM, OUTRIGGERS, AND OTHER STRUCTURAL MEMBERS BE INSPECTED BY A CERTIFIED BOOM INSPECTOR ON A REGULAR BASIS. THE RESULTS SHOULD BE DOCUMENTED CAREFULLY AND A RECORD KEPT. CONSULT THE MANUFACTURERS RECOMMENDATIONS FOR THE PROPER INTERVAL FOR YOUR MACHINE..

#### 13.2 ATTENZIONE !

YOU MUST VISUALLY INSPECT YOUR UNIT EACH DAY BEFORE IT IS PUT INTO OPERATION. IF ANY PROBLEM IS FOUND, YOU MUST NOT BEGIN WORK UNTIL IT IS REPAIRED CORRECTLY!

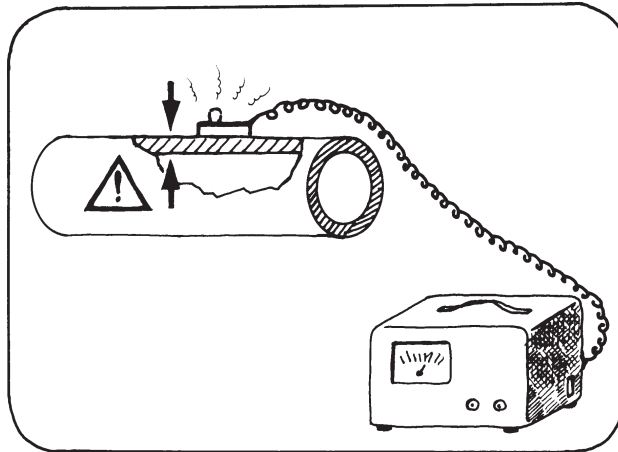


13.3 ANY PROBLEM FOUND ON THE PLACING BOOM, OUTRIGGERS, OR TOWER SECTION OF THE UNIT MUST BE REPORTED TO THE MANUFACTURER SO THAT PROPER REPAIR PROCEDURES CAN BE DESIGNED AND IMPLEMENTED.

- 13.4  **ATTENZIONE !**  
IF SAFETY DECALS ARE FADED, MISSING, DAMAGED OR OTHERWISE UNREADABLE THEY MUST BE REPLACED IMMEDIATELY.
- 13.5  **ATTENZIONE !**  
IF SAFETY DEVICES OR GUARDS ARE REMOVED FOR INSPECTION PURPOSES, THEY MUST BE REPLACED BEFORE WORK COMMENCES WITH THE MACHINE.
- 13.6  **ATTENZIONE !**  
PAY ATTENTION TO THE OPERATION MANUAL AND MANUFACTURER'S SERVICE BULLETINS REGARDING MAINTENANCE AND INSPECTION PROCEDURES AND INTERVALS.
- 13.7  **ATTENZIONE !**  
IF INSPECTION REVEALS SOMETHING THAT LOOKS WRONG, OR EVEN SUSPICIOUS, IT IS BETTER THAT IT BE REPORTED TO THE MANUFACTURER FOR CONSIDERATION THAN TO ASSUME THAT IT'S OK
- 13.8  **ATTENZIONE !**  
INSPECT THE TIP HOSE SAFETY CABLE AND MOUNTING HARDWARE ON A REGULAR BASIS. REPLACE IT IF IT BECOMES OLD, FRAYED OR RUSTED.

13.9  **ATTENZIONE !**

DO NOT NEGLECT THE DELIVERY PIPELINE CLAMPS, AND HOSES. CHECK THEM OFTEN FOR WEAR, DENTS AND FRAYS. NEVER SEND A UNIT TO A JOB WITH WORN OR DAMAGED DELIVERY SYSTEM.



13.10  **ATTENZIONE !**

INSPECT THE BOOM TIE DOWN AND BOOM REST ASSEMBLIES REGULARLY. THE BOOM MUST NOT BE ALLOWED TO BOUNCE DURING TRAVEL.

13.11 VISUAL INSPECTION OF THE CONCRETE PUMP CIRCUITS AND SAFETY DEVICES SHOULD BE DONE DAILY. HANDS ON INSPECTION AND DOCUMENTATION OF RESULTS SHOULD BE DONE WEEKLY, OR AT LEAST WHEN PREVENTIVE MAINTENANCE IS SCHEDULED.

## 14 SAFETY RULES REGARDING SCHEDULED MAINTENANCE

### 14.1 ATTENZIONE !

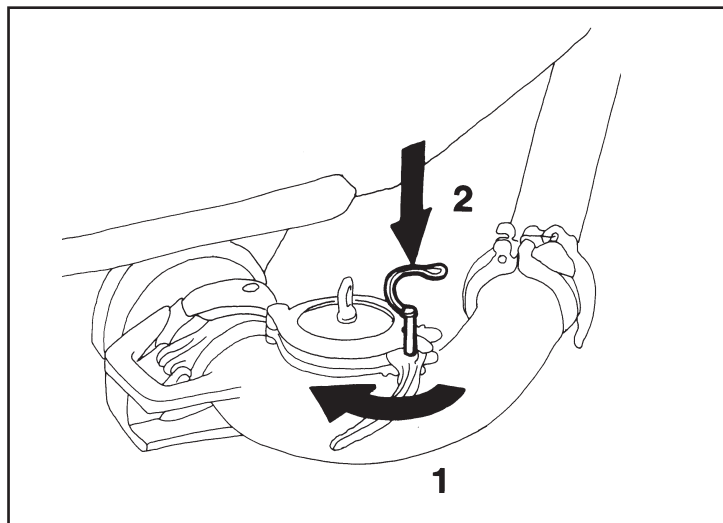
PROPER AND TIMELY MAINTENANCE IS CRUCIAL TO OPERATIONAL SAFETY OF A CONCRETE PUMP AND PLACING BOOM. THE PROCEDURES ARE OUTLINED IN THE OPERATION MANUAL. DO NOT PUT IT OFF. DO NOT TREAT IT LIGHTLY. DO NOT “FUDGE” RESULTS. THE LIVES OF THE OPERATOR, OILER, AND WORKMEN ON THE JOB ARE DEPENDING ON IT.

### 14.2 ATTENZIONE !

KEEP THE MACHINE CLEAN! OIL SPILLS, GREASE, LOOSE TOOLS AND DISPLACED ACCESSORIES WILL CAUSE ACCIDENTS.

### 14.3 ATTENZIONE !

AFTER SERVICING THE PIPELINE SYSTEM ON THE BOOM, BE SURE TO INSTALL THE SAFETY PIN IN EACH CLAMP THAT WILL HANG OVER WORKMEN.



### 14.4 ATTENZIONE !

BE SURE THAT YOU ARE INSTALLING THE CORRECT CLAMPS FOR THE TYPES OF PIPE ENDS USED. NEVER TRY TO MATE DISSIMILAR PIPE ENDS. THERE IS NO CLAMP OR GASKET MADE FOR THIS PURPOSE. SEE THE COMPARISON REGARDING WELD ON ENDS IN THE APPENDIX SECTION OF THIS MANUAL.

**14.5**  **ATTENZIONE !**

WHEN INSTALLING NEW PIPE AND/OR HOSE ON THE MACHINE BE SURE THAT IT IS CAPABLE OF HANDLING THE MAXIMUM CONCRETE PRESSURE OF THE MACHINE.

**14.6**  **ATTENZIONE !**

REMEMBER THAT BOOM PIPE CANNOT HAVE A WALL THICKNESS GREATER THAN 3/16", (7 gauge, or 4.5 mm) DUE TO WEIGHT CONSIDERATIONS. IT IS FOR THIS REASON THAT YOU SHOULD NOT PUMP THROUGH THE BOOM WHEN THE UNIT IS CONFIGURED ON THE PISTON SIDE.

**14.7**  **ATTENZIONE !**

IF SAFETY DEVICES OR GUARDS ARE REMOVED FOR SERVICING, THEY MUST BE REPLACED BEFORE THE MACHINE IS SENT OUT TO WORK.

**14.8**  **ATTENZIONE !**

DO NOT CHANGE THE MAXIMUM RELIEF VALVE SETTING ON ANY HYDRAULIC CIRCUIT WITHOUT PERMISSION FROM THE MANUFACTURER. NEVER CHANGE AN ACCUMULATOR CIRCUIT PRESSURE SETTING WITHOUT SPECIFIC INSTRUCTIONS FROM THE MANUFACTURER.

**14.9**  **ATTENZIONE !**

NEVER MAKE UNAUTHORIZED MODIFICATIONS TO STRUCTURAL MEMBERS AND PRESSURE CIRCUITS.

**14.10**  **ATTENZIONE !**

YOU MUST REPLACE, NOT REPAIR DAMAGED HYDRAULIC OR CONCRETE HOSES OR PIPES.

**14.11**  **ATTENZIONE !**

NEVER TRY TO REPAIR A MACHINE USING WORN, DAMAGED, OR DEFECTIVE COMPONENTS.

**14.12**  **ATTENZIONE !**

WELDING ON THE BOOM, OUTRIGGERS, TOWER, OR ANY OTHER STRUCTURAL MEMBER MAY BE DONE ONLY BY A WELDER CERTIFIED. DO NOT WELD ON ANY STRUCTURAL MEMBERS BEFORE NOTIFYING THE MANUFACTURER.

**14.13**  **CAUTION !**

NEVER ALLOW WELDING CURRENT TO TRAVEL THROUGH BEARINGS OR HYDRAULIC CYLINDERS. KEEP THE GROUND CABLE ON THE COMPONENT THAT IS BEING WELDED.

**14.14**  **CAUTION !**

ELECTRONIC COMPONENTS CAN BE DESTROYED BY WELDING CURRENT. Before welding on the unit, you must disconnect the battery cables, and unplug all radio remote control power wires. If you have a proportional boom system, the proportional amplifiers must be removed from the mother board before welding. If in doubt, contact the service department for instructions before proceeding.

## 15 SAFETY RULES WHEN SERVICING THE MACHINERY

### 15.1 ATTENZIONE !

REPAIRS MUST ONLY BE CARRIED OUT BY QUALIFIED WORKSHOP PERSONNEL

### 15.2 ATTENZIONE !

READ AND UNDERSTAND THE OPERATION MANUAL OF THE MACHINE BEFORE ATTEMPTING ANY REPAIRS. IF IN DOUBT, CALL THE MANUFACTURER. INCORRECTLY DONE REPAIRS ENDANGER OPERATIONAL SAFETY OF THE MACHINE.

### 15.3 ATTENZIONE !

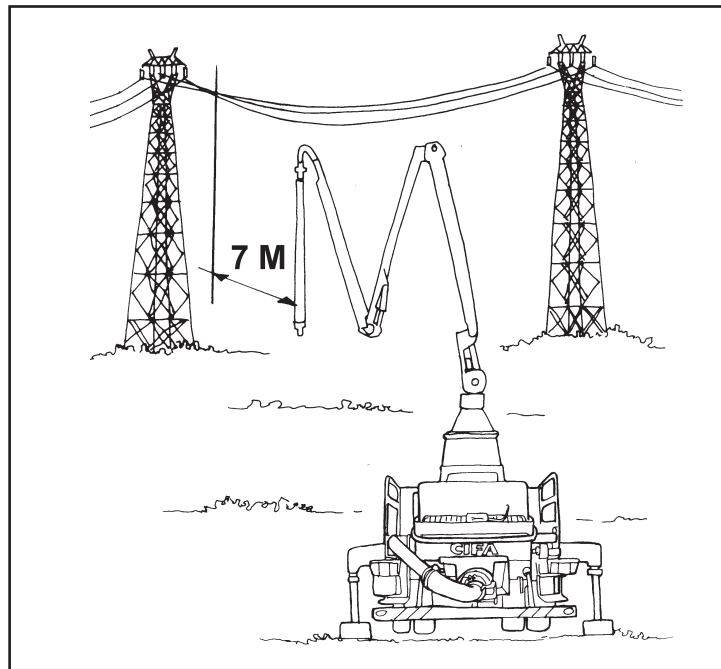
DANGER OF BURNING! NEVER WORK ON A HYDRAULIC SYSTEM WITH HOT OIL.

### 15.4 ATTENZIONE !

IF IT IS NECESSARY TO UNFOLD THE PLACING BOOM TO DO MAINTENANCE WORK, THE OUTRIGGERS MUST BE EXTENDED AND JACKED, JUST AS IF THE MACHINE WERE ON A JOB SITE

**15.5**  **ATTENZIONE !**

DANGER OF LIFE! 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 OF 23,8 FT. (7 METERS) CLEARANCE BETWEEN THE POWER LINE AND ANY PART OF THE UNIT.

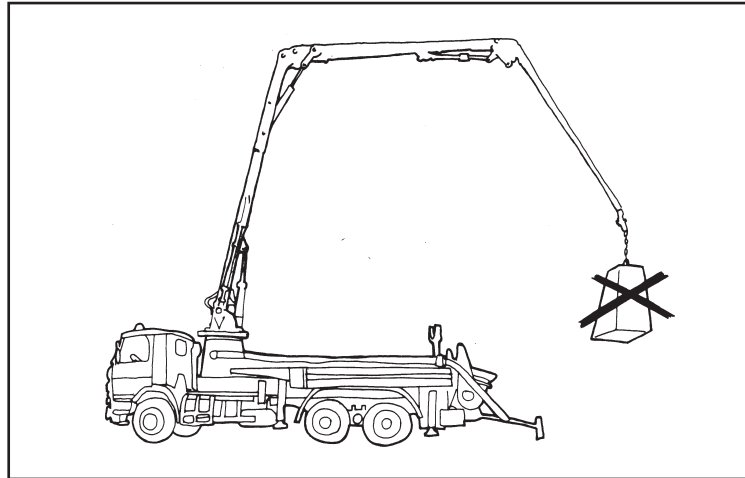
**15.6**  **ATTENZIONE !**

IF YOU CANNOT WORK AT GROUND LEVEL, YOU MUST USE A SUITABLE WORK PLATFORM. SECURE YOURSELF FROM FALLING!



**15.7**  **ATTENZIONE !**

WARNING! IF MAINTENANCE WORK REQUIRES THAT YOU USE A CRANE, HOIST, FORK TRUCK, ETC., YOU MUST READ AND UNDERSTAND THE SAFETY REGULATIONS FOR THAT EQUIPMENT. REMEMBER, THE BOOM MAY NOT BE USED AS A HOIST OR CRANE!

**15.8**  **ATTENZIONE !**

THE PLACING BOOM MUST BE SECURED FROM FALLING, AND PRESSURE MUST BE RELIEVED, BEFORE WORKING ON THE BOOM HYDRAULIC SYSTEM.

**15.9**  **ATTENZIONE !**

IF WORK ON THE MACHINE REQUIRES THAT IT BE OPERATED, AND YOU ARE NOT QUALIFIED AS AN OPERATOR, YOU MUST GET SOMEONE WHO IS QUALIFIED TO ASSIST YOU.

**15.10**  **ATTENZIONE !**

DANGER OF ELECTROCUTION! REPAIR WORK ON ELECTRICAL SYSTEMS (PARTICULARLY HIGH VOLTAGE SYSTEMS) MAY ONLY BE DONE BY QUALIFIED ELECTRICIANS.

**15.11**  **ATTENZIONE !**

BE SURE THAT YOU UNDERSTAND THE POTENTIAL DANGER OF SPRING LOADED OR COMPRESSED GAS COMPONENTS BEFORE YOU DISASSEMBLE THEM. (e.g., nitrogen accumulator, tires, brake chambers) IF YOU DON'T KNOW THE DANGERS, CALL THE MANUFACTURER BEFORE BEGINNING WORK!

**15.12**  **ATTENZIONE !**

IF YOU WILL BE WORKING IN A HIDDEN AREA INSIDE THE MACHINE:

- a. WITH A GAS OR DIESEL ENGINE, REMOVE THE IGNITION KEY AND PLACE A “DO NOT OPERATE” SIGN ON THE CONTROLS. Carry the key on your person.
- b. WITH AN ELECTRICALLY DRIVEN PUMP, LOCK OUT THE MAIN BREAKER AND TAG THE CONTROLS.

**15.13**  **ATTENZIONE !**

NEVER ACTIVATE THE SYSTEM HYDRAULICS WITHOUT CHECKING IF ANOTHER WORKMAN IS IN A HIDDEN POSITION. ALWAYS YELL “CLEAR” BEFORE STARTING THE PRIME MOVER, AND ALLOW TIME FOR RESPONSE.

15.14 REMEMBER TO MOUNT AND DISMOUNT THE UNIT USING THE “3 POINT RULE”. (One hand and two feet or two hands and one foot are to be in contact with a secure surface at all times).

**15.15**  **ATTENZIONE !**

NEVER WORK ON A PRESSURIZED HYDRAULIC SYSTEM. STOP THE PRIME MOVER AND RELIEVE THE ACCUMULATOR CIRCUIT (if so equipped) BEFORE YOU OPEN THE HYDRAULIC SYSTEM.

**15.16**  **ATTENZIONE !**

NEVER USE GASOLINE OR DIESEL FUEL AS A CLEANING SOLVENT. This is critical to remember when clearing hydraulic oil reservoirs, because gas and diesel fuels are highly explosive, and GASOLINE OR DIESEL FUEL TRACES LEFT IN THE OIL MAY IGNITE WHEN COMPRESSED!

**15.17**  **ATTENZIONE !**

AFTER MODIFICATIONS TO STRUCTURAL MEMBERS (boom, outriggers, tower, etc.) THE REPAIR MUST BE INSPECTED BY QUALIFIED PERSONNEL BEFORE USE.

**15.18**  **ATTENZIONE !**

ALWAYS USE THE CORRECT TOOLS FOR THE JOB. Tools should be kept clean, and in good condition.

**15.19**  **ATTENZIONE !**

IF YOU SEE A CO WORKER ENGAGING IN AN UNSAFE PRACTICE, WARN HIM ABOUT THE DANGERS. SAFETY IS ALWAYS IN THE HANDS OF THOSE ON THE JOB!

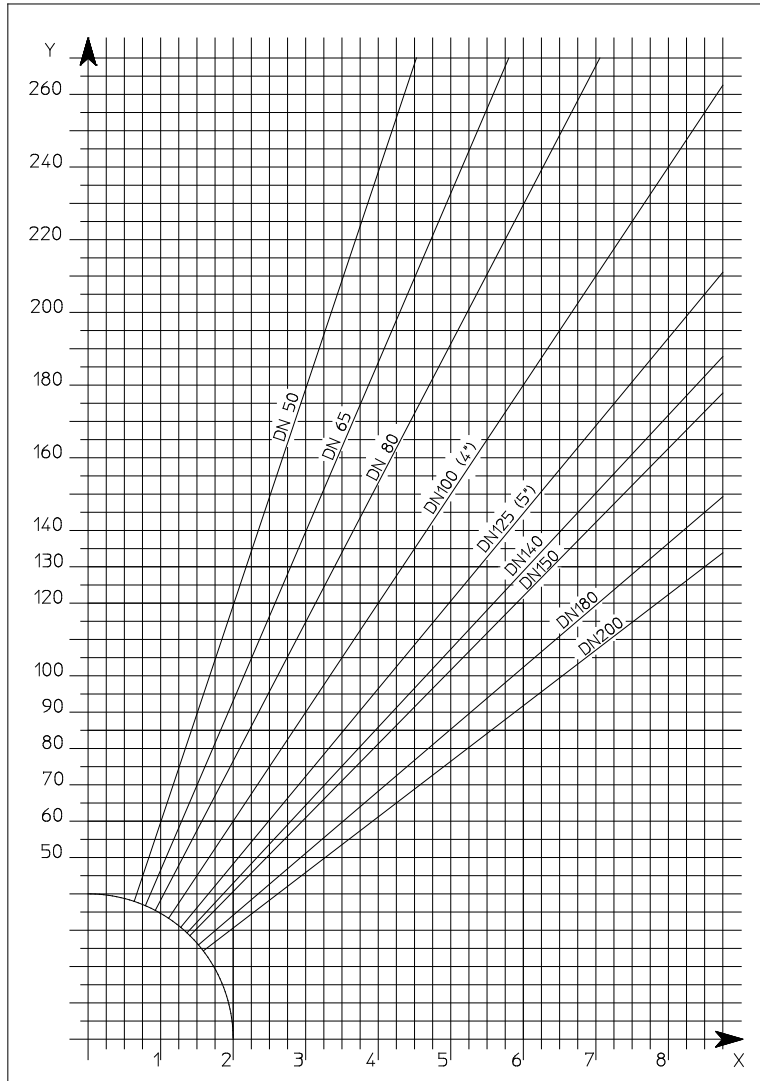


# SAFETY MANUAL

## Section E ENCLOSED



**16 MINIMUM PIPE WALL THICKNESS CHART**



X-axis = walls minimum thickness

Y-axis = operating pressures

PL = Operating Pressures

DN = Major Diameter

Reading example: if PL = 70 bar    DN = 125 mm

Mark an horizontal line (line A) at height 70 on Y-axis, up to cross the right line DN 125. From crossing point, mark a vertical line (line B) up to cross the X-axis, which determines the piping minimum thickness = 2.9 [mm].

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