PLAINTIFF'S EXHIBIT
UC 83A

Nisbet 1963-1967

Safe Practices Manual

Maintenance Department

July 15, 1964



UNION CARBIDE CORPORATION
CHEMICALS DIVISION
Texas City, Texas

SC 008456

EMERGENCY
TELEPHONE
NUMBERS

FIRE
333

DISPENSARY
444, 502

SAFETY DIVISION
603, 680

Safe Practices Manual

Maintenance Department

July 15, 1964

UNION CARBIDE

UNION CARBIDE CORPORATION
CHEMICALS DIVISION
Texas City, Texas

SC 008457

INTRODUCTION
TO MAINTENANCE
SAFE PRACTICES MANUAL

This manual has been prepared in an effort to help each man perform his daily job safely. In it you will find general safety rules applying to all Maintenance men and special rules for each craft.

Rules, though important, can not by themselves prevent accidents. Each individual must consider what he is about to do and be alert to prevent injury both to himself and his fellow worker. It is only through this attitude that we can have an accident free plant.

Your help in following and improving these rules is earnestly requested. If in doubt ask your foreman.

H. E. Padgett

Plant Maintenance Superintendent

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THINK! BEFORE YOU ACT!

PLANT SAFETY RULES

POLICY:

Safety rules shall be established for and observed by all Plant personnel.

RULES:

1. Matches or cigarette lighters are not allowed in the plant.
2. Smoking in the plant is prohibited. Violators are subject to immediate discharge.
3. Report all injuries to your foreman and the Dispensary immediately.
4. Proper goggles must be worn when working on equipment or pipes containing chemicals; when grinding, welding, cutting, chipping steel or concrete; when working in dusty places; or any other job when specified by the supervisor.
5. Adequate clothing, including footwear, should be worn depending on the particular job that the employee is engaged in. Do not wear loose clothing around moving machinery.
6. "Horse play" on the job will not be tolerated.
7. Observe all signs and follow their directions.
8. Safety guards, if removed for repairs or adjustment, must be replaced before machinery is started.

IF IN DOUBT CONSULT YOUR FOREMAN.

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9. All electrical repairs must be made by electricians. Electrical control rooms are not to be entered except by authorized personnel.

10. Do not use any unsafe tools. Ground all portable electric tools before using.

11. Do not get on or off moving vehicles at any time. Riding on running boards or having any part of body extending outside truck bed or cab is strictly forbidden. All riders must be seated.

12. Never use a defective ladder. Ladders should be securely fastened or held by someone on the ground and both hands should be used when climbing. Face the ladder when ascending or descending. Materials and tools shall be raised and lowered by means of handline.

13. Use caution in all material handling. Always use proper lifting methods. Avoid strains by keeping the back as nearly upright as possible.

14. Do not direct compressed air at anyone or use it to clean clothing except at approved low-pressure stations. When cleaning parts or blowing liquid from air hose, direct force away from all parts of body.

15. Fire fighting equipment should be used for fire fighting only. Place no obstruction within fifteen feet of alarm boxes, fire plugs and hose houses. In case of fire, sound nearest alarm or dial 333.

16. The plant speed limit of 15 MPH must be observed at all times.

THINK! BEFORE YOU ACT!

17. Gas masks are provided at each unit for protection against fumes and vapors encountered in the unit. They should never be used to enter poorly ventilated tanks, vessels or rooms.

18. When loading or cleaning chemical storage tanks, tank cars or barges, the following precautions shall be used:
    a. Avoid breathing fumes after removal of manhole covers.
    b. Never enter a tank, tank car or barge without a safety belt and unless someone is outside to assist in case of emergency.
    c. A fresh air mask or airline respirator should be available in case of emergency and should always be used to enter poorly ventilated equipment.
    d. Use only spark resistant (brass, bronze, copper, plastic or wood) tools.
    e. Use only approved flashlights, electric lanterns or extension cords.

19. Do not use "plant air" for respiratory protective equipment.

20. Form CT-1441-D "Hazardous Work Permit" is required before entry or any operation which produces flame, spark, or hot surfaces is started within the manufacturing area. The proper procedure for protection against Carbon Monoxide exposure must be completed before work is begun in areas where Carbon Monoxide is processed.

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21. Before starting work on equipment or machinery, the following procedure should be followed:
    a. Lock out switches on all power-driven machinery.
    b. Attach tags on all valves and switches.
    c. Post necessary warning signs.
22. Employees must wear or use the protective equipment and follow the safe practices or procedures given in written job instructions. All safety requirements specified and published by the department or craft must be observed.
23. If you are not sure of instructions, ask your supervisor before proceeding.
24. Wash chemical spills or splashes from body and eyes immediately, using the safety shower or eyewash fountains, and then report to the Dispensary. After using safety shower, remove chemically saturated clothing.

SAFE PRACTICES FOR ALL MAINTENANCE EMPLOYEES

1. All employees must be familiar with and observe the Plant Safety Rules.
2. Think ahead. Spend at least one minute at the start of each day and at the start of each job. Think of safety. Think of the hazards involved, then eliminate or avoid them. Continue to think while you work, then ask yourself, is it safe, am I working in a safe manner?
3. In the parts of the plant that have been designated as noise areas, ear plugs should be used. These may be obtained from the Plant Medical Division.
4. Know the location of Safety Showers and Solution Cabinets in the vicinity of your job.
5. Where a Hazardous Work Permit (Form CT-1441 D) or a "Work Permit for Protection against Carbon Monoxide" is required, be sure that you READ, understand and comply with the conditions contained therein. A permit in itself does not make a job safe. Only do the work the permit authorizes; any other work or job requires a separate permit.
6. Side shield safety spectacles are the minimum type eye protection furnished all employees.
7. When grating is removed, be sure to provide adequate barricades and warning signs. If necessary, provide temporary flooring. Replace permanent grating as soon as work is com-

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pleted. USE GRATING HOOKS TO HANDLE GRATING AT ALL TIMES.

8. All area or unit safe practices and special rules shall be complied with.

9. Housekeeping is an essential part of safety. Clean up your job site immediately upon completion of work.

10. Safety begins with the individual. Every employee should consider it a part of his duties to take an active part in all Safety Work, and should encourage the observance of safe practices by his fellow workers.

11. Use only safe ladders. See that supports and rungs are in good order and that ladder is tied off properly.

12. Hard hats, goggles or other protective equipment must be worn when required in certain areas or units.

13. Use proper method of lifting. Stand properly in lifting: bend knees and bring body up with load. Do not lift too heavy a load.

14. It is usually an unsafe practice to take short cuts. Avoid this hazard; use sidewalks and roadways.

15. Each employee must be sure that he is preparing to work on the right piece of equipment or line. Be sure you understand the job, but if there is any doubt, CHECK with YOUR FOREMAN.

16. DO NOT walk on transite or corrugated plastic roofs without first providing a safe and adequate load bearing support. Use 4' x 8' x ½" plywood.

17. There are many toxic materials that are hazardous when subjected to heat or friction, i.e., teflon or berylium. Be sure you know the hazards.

18. Tag-out/Lock-out procedure must be followed.

19. When using high pressure cleaning equipment such as water pumps, be sure that you know and follow the proper operating instructions and safety instructions.

20. Do not crawl under or climb over railroad cars or attempt to pass between cars that are standing close together on the same track except at loading docks which are guarded. Be sure that derail is in proper place.

21. Couplings and hose connections on pneumatic tools must be inspected to see that they are safely attached and in good order.

22. Do not carry tools when climbing ladders. Use a hand line; keep both hands on ladder.

23. Know the location of safety showers and eye baths. Have water supply available when handling injurious materials.

24. Be careful not to create foot hazards when using electric cords and hoses. Keep stairways, walkways and floor clear.

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25. Inspect extension cords to see that vapor shields and all connections are in proper order. Do not remove vapor shields or attempt to repair or alter in any manner.

26. Know the locations of fire alarms and stretchers nearest your work area.

27. High pressure water pumps must be equipped with an automatic shutoff or deadman control. DO NOT USE PUMP WITHOUT IT.

28. When drilling or chipping in masonry or concrete floors, walls, pads, etc., where there is a possibility of electrical conduit being near, the following procedure will be followed:

    a. The chipping or drilling device should be grounded to the building or vessel steel, or through a galvanized rod driven five feet into the ground by a number 6 cable (welding cable).

    b. The man doing the work and his helper or helpers should wear rubber boots, rain suits, plastic gloves, and face shields.

    c. Electrical drawings should be checked for conduit locations in the vicinity of the work.

29. Do not use hands to guide cable on drums of any type.

30. Never use toxic materials such as epoxies or chlorinated hydrocarbons, without the proper ventilation and protective equipment.

THINK! BEFORE YOU ACT!

SAFE PRACTICES
FOR RIGGING
FOR
ALL MAINTENANCE EMPLOYEES

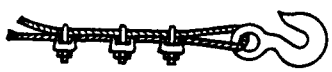
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GOOD AND BAD RIGGING PRACTICES



Bad Practice—Wire rope knot with clip. Efficiency 50% or less.



Bad Practice—Thimble should be used to increase strength of eye and reduce wear on rope.



Good Practice—Use of thimble in eye splice.



Good Practice—Note use of thimble in eye splice.



Wrong Method—U-Bolt on live end of rope. (This will cause mashed spots on live end of rope.)



Wrong Method—Staggered clips; two correct and one wrong. (This will cause a mashed spot in live end of rope due to wrong position of center clip.)

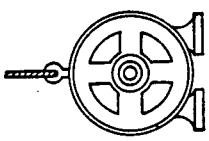
Number of Clips and Distance Between Clips Needed for Safety

Diameter of Rope (Inches)	Number of Clips	Distance Between Clips
1/4 - 3/8	3	2 1/4"
7/16 - 5/8	4	3 3/4"
3/4 - 1 1/8	5	6 3/4"
1 1/4 - 1 1/2	6	9"
1 5/8 - 1 3/4	7	10 1/2"

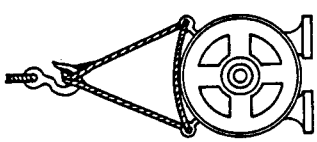
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EYE BOLTS



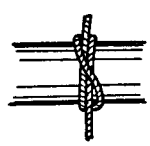
Vertical lift on eye bolt is good practice.



Bad Practice - Lifting on eye bolts from an angle reduces safe loads as much as 90%.

APPROXIMATE EFFICIENCY OF MANILA ROPE KNOTS AND CONNECTIONS AS COMP'RED TO SAFE LOAD ON MANILLA ROPE

Clove Hitch



% Strength - 75%

Bowline-Outside



% Strength - 50%

Bowline-Inside



% Strength - 53%

Square or Reef Knot



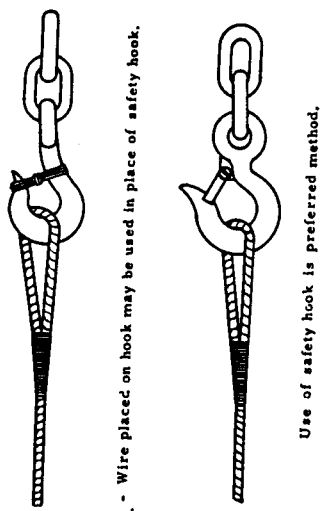
% Strength - 43%

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THINK! BEFORE YOU ACT!



MOUSING - Wire placed on hook may be used in place of safety hook.

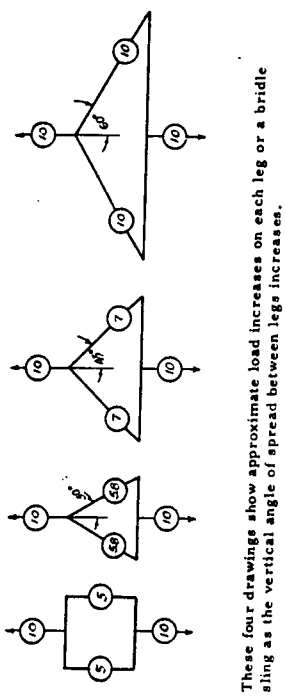
Use of safety hook is preferred method.

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16

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HOW SLING-LEG LOAD INCREASES WITH INCREASED FLEET ANGLE



These four drawings show approximate load increases on each leg or a bridle sling as the vertical angle of spread between legs increases.

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THINK! BEFORE YOU ACT!

ANCHOR SHACKLES - Forged Steel (Screw Pin)

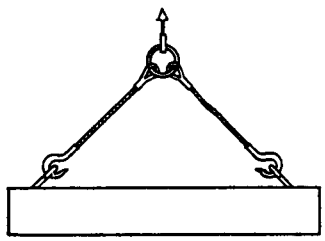


Shackle Size	Pin Size	Safe Load in Tons	Shackle Size	Pin Size	Safe Load in Tons
1/4"	5/16"	.35	1 1/8"	1 1/4"	6.6
5/16"	7/16"	.79	1 1/4"	1 3/8"	8.2
7/16"	1/2"	1.0	1 3/8"	1 1/2"	9.9
1/2"	5/8"	1.4	1 1/2"	1 5/8"	11.6
5/8"	3/4"	2.2	1 3/4"	2"	16.1
3/4"	7/8"	3.1	2"	2 1/4"	21.1
7/8"	1"	4.3	2 1/4"	2 1/2"	27.0
1"	1 1/8"	5.6	2 1/2"	2 3/4"	33.8

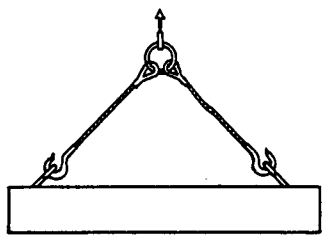
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18

THINK! BEFORE YOU ACT!



Bad Practice - Hook openings should be turned out.



Good Practice - Hooks are turned out.

IF IN DOUBT CONSULT YOUR FOREMAN.

19

SAFE PRACTICES FOR HANDLING OF WELDING MACHINES, AIR COMPRESSORS AND CYLINDERS BY MAINTENANCE PERSONNEL

Welding Machines and Air Compressors:

1. Gas driven electric welding machines and portable air compressors should not be parked on Third Street, Fourth Street or Fifth Street at any time, unless they are parked inside of the curb.
2. These machines must not be parked under a pipe rack at any time.
3. When it is not convenient to park these machines behind the units, it is permissible to park them on the avenues which run east and west.
4. These machines should be parked in as near a level position as possible for safe operation.
5. These machines shall not be humped over curbs.
6. These machines are equipped with four wheels and hitch. They shall be towed behind a truck and not on a winch truck "A" frame.
7. The representative from the Safety Department assigned to each area shall see that these recommendations are carried out.
8. When transporting welding machines and air compressors outside the plant, a safety chain must be used.

Transportation of Cylinders:

1. Cylinders, full or empty, are to be hauled on the bed of a truck or on a two-wheel welders' buggy.
2. When hauling or moving oxygen and hydrogen cylinders the safety cover caps must be in place on the cylinder.
3. Truck drivers should be cautioned to drive carefully while hauling a two-wheel welders' buggy.
4. All welders' buggies must be equipped with safety straps to hold cylinders in place.
5. All Shop Welders and Leadburners going to the field should be equipped with a welders' buggy.
6. All Shop Welders and Leadburners going to the field must be equipped with a 15-lb. CO_2 fire extinguisher.

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SAFE PRACTICES FOR AIR CONDITIONING AND REFRIGERATION

1. Tools must be in good condition.
2. Observe rules pertaining to lifting and moving machinery.
3. Do not work on electrical controls while they are in service.
4. Do not remove cover on control box in the field before power is turned off.
5. Observe safety rules pertaining to extension cords. Ground all electrical tools.
6. Do not expose refrigerant containers to heat. Cylinders should not be allowed to get above 130° F.
7. Be sure to use low and high pressure gauges when filling a system.
8. Never fill cylinders with more than they are specified to hold. Always fill by weight.
9. Do not change type of refrigerant without making sure it will not corrode system.
10. Keep compressor rooms clean and free from oily rags.
11. Keep fire extinguisher handy.

THINK! BEFORE YOU ACT!

12. Do not vent toxic or flammable vapors into compressor room.
13. Use gas mask when exposed to refrigerant vapors.
14. Avoid breathing fumes from cleaning solvents.
15. Never use screwdriver, etc., to actuate electrical switches.
16. Wear rubber gloves when using cleaning solvents.

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SAFE PRACTICES FOR AUTO MECHANICS

1. Never run internal combustion engines inside of tightly closed building; always be sure of proper ventilation or have exhaust run to a manifold to carry the fumes into the open.
2. Never fill gasoline fuel tank on automobiles, trucks, welding machines, pumps, compressors or starting engines while engines are running. This does not include diesel engines.
3. When it is necessary to do grinding or use torch near gasoline filler neck on automobiles or trucks, always keep covered with wet cloth.
4. Never use open flame torch to repair any fuel tank until the tank has been thoroughly steamed, and Test and Inspection Division has made an explosion test and OK'd same as safe to use open flame.
5. Always wipe up any spillage of gasoline on equipment, cars, trucks or floor immediately to prevent fire and explosion.
6. Always keep parts cleaning solution covered when not in use.
7. Always disconnect battery before working on electrical units or when doing a major repair job on cars and trucks.
8. Always use the correct wrench. Do not use wrench on wrench as cheater.
9. In raising one end of a car, truck or similar equipment always use two (2) steel chokers of suitable size and at equal lengths by securing one end of each choker to each frame side member, the free end of choker to lifting hook.

10. Always provide stands under axles when vehicle is jacked up to work undearneath; never trust jacks alone.
11. Always wear a safety hat while in the field.
12. Wear safety shoes for your own protection.
13. Avoid striking on steel hammer with another steel hammer.
14. Avoid using case-hardened bolts or shafts for punches.
15. Avoid striking case-hardened parts with steel hammer or steel punches.
16. Avoid creating sparks around freshly charged storage batteries. The hydrogen gas given off during charging makes battery eplosive.
17. Good Housekeeping:
    (a) Do not let discarded parts lie around. Dispose of them in containers provided for same.
    (b) Keep bench clean.
    (c) Keep tools clean and in good condition.
    (d) Keep corners and wall space clean.
    (e) Keep grease and oil cleaned up off of floor.
    (f) Keep oily rags in container provided for same.
    (g) A clean, tidy shop automatically promotes safety and better working conditions. Get that habit of good housekeeping.

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18. Learn to respect compressed air; it can be very dangerous. Do not use air to clean off your clothing or to blow it on your body, and never direct an air hose at anyone.
19. Enjoy life. So do not take that unnecessary chance that might cause you or your fellow workers a physical injury.
20. **LPG POWERED VEHICLES.**
    (a) Keep L.P.G. propelled vehicles outside when the tanks are filled above 92% density in summer or 80% density in winter.
    (b) Check the fuel system for leaks. Repair any which are found before entering the garage.
    (c) Park the vehicle at least ten feet from any heater and out of the direct path of hot air from a blower heater. These steps minimize the chance of liquid expanding and the tank relief valve blowing.
    (d) When the engine is off, shut off all fuel lines at the tank.
    (e) If repairing the fuel system itself, be careful to prevent L.P.G. from escaping inside the building.
    (f) Repair L.P.G. containers or auxiliary equipment only when known to be gas free.
21. All aluminum containers must be ventilated before entering for repairs.
22. All aluminum containers must be tested with an explosion meter before welding.
23. Do not weld on container with product in it.

SAFE PRACTICES FOR BOILERMAKERS, IRONWORKERS, RIGGERS AND CRANE OPERATORS

1. Any time you are not sure the material or equipment is satisfactory for the job, take it up with your supervisor.
2. Jin poles and derricks should be checked by your supervisor for safe working loads. If there is any doubt, the Engineering Department should be consulted.
3. Ropes, chains and cables must not be used if defective. Keep your equipment in good condition.
4. Ropes and cables should be protected with pads or blocks where taken around sharp edges.
5. Hand ropes (guides) should be attached to the hoisting tackle and not to the sling.
6. Slings should not be used single in slip-noose form, nor should two single slings be used at one point to get double strength. On general work, slings should be spliced endless.
7. Hemp rope is not to be used for slings on material contaminated with acid.
8. Defective chains, ropes and cables are not to be left lying around where someone may use them.

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9. Repairs must not be made to chains by bolting links together.
10. Chains should be repaired or discarded when they show permanent signs of stretch in any link, or when any link shows appreciable wear, or if any link has been bent or dented.
11. Secure chain blocks with cable rather than with manila rope.
12. Manila rope not in use should be hung up under cover.
13. All rope is to be inspected before being used. Rope that is badly frayed, rotted, or has been exposed to direct action of acid or caustic should not be used.
14. Thimbles, when used, must be sliced into the rope by an experienced man.
15. On wire rope, thimbles are to be held in place with "U" clips; "U" bolts of all clips to be on the dead end and the saddle or base of clip on the main end of rope.
16. Sizing, socketing or splicing wire rope should be done only by experienced men.
17. In uncoiling wire rope, it is important that no kinks are allowed to form, as once a kink is made no amount of strain can take it out, and the rope is unsafe.
18. Guy lines are not to be made fast to equipment, pipe lines, tanks or their supports, unless jointly authorized by the Maintenance and Production Superintendents or their authorized and designated representatives.

19. When doing rigging work in the immediate vicinity of electric wires where contact may be made, call the Electric Department and request the necessary protection.
20. When using chain falls with two or more parts in load chain, check and be sure no twist is in load chain.
21. Hoisting machinery should be inspected before use, and tested before being used on heavy loads.
22. Exercise every effort to prevent anyone from walking under suspended loads or in the vicinity of lines holding a strain.
23. When using electric hoists (Bldgs. 11, 120, 121) or air operated cranes (Bldgs. 7, 102, 143, 148, 79) always place a man on bottom level to caution personnel. Do not stand under load.
24. Hoisting machine or crane operators must be continually alert and must keep their eyes on the man giving signals.
25. In giving signals keep attention on the load.
26. Examine boom lines and hoist ropes frequently. Give careful attention to the section passing over equalizer or compensating sheaves.
27. Never exceed rated capacity of hoists.
28. Wire ropes should not be used if more than three outside adjacent wires are broken within a length of one lay, or if outer wires are worn two-thirds of their original diameter, or if marked corrosion appears.

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29. Loads should not be applied to cables, ropes or chains with a sudden jerk, for the resulting stress may equal many times the weight to be lifted.

30. Crane mats should not be stacked more than four mats high.

31. All guy derricks are to be rigged up completely on the ground with the boom lying down assuring sufficient length of cable. Drums on the hoist are to be checked for sufficient turns of the cable at all times and in no instance should the number of turns of the cable on the drum be less than five.

32. In attaching cable to the drums, the end of the cable must be looped around the thimble, and the end clamped down tightly to the drum.

33. Copper-bearing thread and gasket dope should not be used.

34. All piping and equipment must be clean and gas free before being delivered to the shop for welding or other repairs. When this is not possible the shop must be notified, and the hazards remaining mutually understood.

35 Personnel will not be permitted to ride headache ball, except under special conditions and with the permission of the heavy equipment supervisor. In cases where a load is to be lifted in excess of load chart capacity, or the crane has to be walked with a load, specific approval must be obtained.

36. The following procedures are to be followed when working in boilers:

(a) Do not enter fire box until spool has been removed from the main gas header and line is blinded off.

(b) Boilers to be prepared for entry or hazardous work must be emptied of liquid contents, purged, blinded, vented, cooled, ventilated and tested for hazardous gases.

(c) Do not open boiler head until all pressure is off and boiler drained.

(d) Do not use the 110-volt light system while working inside boiler drum.

(e) When tubes are to be rolled or rerolled do not attempt to roll them alone. Use at least two (2) men on motor.

(f) Care should be taken at all times to avoid dropping any foreign materials into tubes.

TUBE BUNDLE REPAIRS

1. **Plugging Tubes**

   a. Vessels should be pressured with water wherever possible to find leaks. After leaking tubes are located, all pressure should be vented down. Plugs should then be driven in squarely.

   b. Where operating medium is used, proper eye protection and/or clothing should be worn.

   c. Be sure the tapered plug is the proper size for the tubes.

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d. Always keep your person in the clear. Do not get in the line of trajectory in case plug blows out.

2. **Removing Plugs**

a. Be sure that all pressure is blown down on the shell side. Even then there is a possibility that pressure may be trapped in the tube between the plugs.

b. Where possible, relieve any residual pressure by drilling a small hole in the plug or in the tube itself.

c. Stand in the clear and tap plug sideways with a hammer.

d. Be sure that you are standing in the clear and that nobody else is endangered.

e. All tube bundles that are going to be scrapped should have all plugs removed or the tube punctured.

f. When drilling tube bundles in the drill press, all plugs should be removed or pressure released from tube before drilling.

6 X 19 IMPROVED PLOW STEEL, HEMP CORE

Inches	Breaking Strength in Tons	Work Load in Tons
1/4	2.74	.5
5/16	4.26	.8
3/8	6.10	1.2
7/16	8.27	1.6
1/2	10.7	2.1
9/16	13.5	2.7
5/8	16.7	3.3
3/4	23.8	4.7
7/8	32.2	6.4
1	41.8	8.3
1 1/8	52.6	10.5
1 1/4	64.6	12.9
1 3/8	77.7	15.5
1 1/2	92.0	18.4
1 5/8	107.0	21.0
1 3/4	124.0	24.8
1 7/8	141.0	28.2
2	160.0	32.0
2 1/8	179.0	35.8
2 1/4	200.0	40.0
2 1/2	244.0	48.8

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6 X 19 IMPROVED PLOW STEEL, WIRE ROPE CORE

Inches	Breaking Strength in Tons	Work Load in Tons
¼	2.94	.6
5/16	4.58	.9
⅜	6.56	1.3
7/16	8.89	1.8
½	11.5	2.3
9/16	14.5	2.9
⅝	17.9	3.6
¾	25.6	5.1
⅞	34.6	6.9
1	44.9	9.0
1⅛	56.5	11.3
1¼	69.4	13.9
1⅜	83.5	16.7
1½	98.9	19.8
1⅝	115.0	23.0
1¾	133.0	26.6
1⅞	152.0	30.4
2	172.0	34.4
2⅛	192.0	38.4
2¼	215.0	43.0
2½	262.0	52.4
2¾	314.0	62.8

IF IN DOUBT CONSULT YOUR FOREMAN.

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THINK! BEFORE YOU ACT!

6 X 37 IMPROVED PLOW STEEL, HEMP CORE

Inches	Breaking Strength in Tons	Work Load in Tons
¼	2.59	.5
5/16	4.03	.8
⅜	5.77	1.1
7/16	7.82	1.5
½	10.2	2.0
9/16	12.7	2.5
⅝	15.8	3.1
¾	22.6	4.5
⅞	30.6	6.1
1	39.8	7.9
1⅛	50.1	10.0
1¼	61.5	12.3
1⅜	74.1	14.8
1½	87.9	17.5
1⅝	103.0	20.6
1¾	119.0	23.8
1⅞	136.0	27.2
2	154.0	30.8
2⅛	173.0	34.6
2¼	193.0	38.6
2½	236.0	47.2

IF IN DOUBT CONSULT YOUR FOREMAN.

35

6 X 37 IMPROVED PLOW STEEL, WIRE ROPE CORE

Inches	Breaking Strength in Tons	Work Load in Tons
¼	2.78	.6
5/16	4.33	.9
⅜	6.20	1.2
7/16	8.41	1.7
½	11.0	2.2
9/16	13.9	2.8
⅝	17.0	3.4
¾	24.3	4.9
⅞	32.9	6.6
1	42.8	8.6
1⅛	53.9	10.8
1¼	66.1	13.2
1⅜	79.7	15.9
1½	94.5	18.9
1⅝	111.0	22.2
1¾	128.0	25.6
1⅞	146.0	29.2
2	165.0	33.0
2⅛	186.0	37.2
2¼	207.0	41.4
2½	254.0	50.8
2¾	305.0	61.0

SAFE PRACTICES FOR CARPENTER DEPARTMENT

1. Carpenters pave the way for others to work in safety; other men's lives depend on your personal thoroughness in performance of your work.
2. Be sure to be familiar with the scaffold building code of this plant. Keep in mind the following points:
   (a) Material should be the best obtainable and carefully constructed.
   (b) Safe means of access should be provided.
   (c) Where possible, the working space should be sufficient to permit workmen to move freely and safely about their work.
   (d) The scaffold should be so constructed as to provide the greatest safety under full load.
   (e) Exposed edges should be guarded by proper railings. Where construction will permit, toe plate should be added. Be sure the up-right posts rest on a solid foundation so that there is no danger of settling.
   (f) Do not permit workers to use scaffold before it is completed.
3. Care should be used in handling lumber. Guard against splinters from boards slipping through

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the hands. Don't let a board fall; it may cause an accident.

4. Remove nails or bend them over.

5. All scaffold boards must have a cleat securely attached to each end.

6. When using shoring, make sure that any bearing plates and/or wedges are securely fastened to prevent them from falling if shoring becomes loosened.

7. Only experienced men are permitted to operate woodworking machinery.

8. A dull saw is dangerous. It retards speed and may break.

9. Stop your machine before leaving it. Another person may get hurt by it.

10. Learn to stand out of the line of possible "kickback." Pieces of wood are frequently shot away from the machine and have often caused serious injury.

11. Employees working around woodworking machinery must not wear gloves, hand leathers, or unsuitable clothing, such as ragged sleeves, loose coats, and ties.

12. Never oil the saw or change the gauge while the machine is running.

13. Do not allow material to accumulate on saw table. Keep the floor free from slipping and stumbling hazards.

14. Woodworking machinery shall be frequently checked by foreman for defects.
Examples:
    (a) Bandsaws, test for tension — twist — kinks.
    (b) Saws must be sharp — not cracked — properly mounted.
    (c) Check planer, shaper, and jointer knives, bolts, nuts and clamps.

15. In machine sawing, push small pieces through with a stick.

16. Leave all guards in place when sawing, if possible; and do not leave a running saw unattended.

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SAFE PRACTICES FOR OPERATING DEMPSTER DUMPSTER TRUCK

1. Do not move bucket with liquid unless proper authorization has been given and Plant Procedure No. 19 is being followed.
2. Handle all liquid buckets with care.
3. Never stand under or remove trash from bucket while it is in raised position.
4. Keep truck speed to 15 miles per hour in Plant and 25 miles per hour on highway.
5. When the Utility Department has completed draining a Dempster tank, the tank is to be flushed out with water. When a spare bucket is used for temporary hauling of liquids it also is to be washed out with water.
6. Do not stand between Dempster truck and a bucket or platform when truck is in the process of picking up a bucket.
7. Never let an employee ride on the back unit of the truck.

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THINK! BEFORE YOU ACT!

SAFE PRACTICES FOR DOCK AREAS

1. Before entry into tanks on barges or ships is made this procedure must be followed:
   (a) Explosion meter test made.
   (b) Oxygen content of tank checked.
   (c) Proper hazardous work permit secured, and followed.
   (d) Tank must be properly ventilated.
2. Escape masks must be worn when working on chlorine barge, tanks and piping.
3. When working on a barge, a life ring should be provided on the outboard side of the barge.
4. When ascending or descending ladder on SHIP.be sure to place hands on side rail of ladder.
5. When ship-to-shore connections are being made, slack should be given to allow for tide, wind, etc.
6. No liquid or solid material should be discharged into slip without first securing permission from Marine Department Head.
7. SPEED LIMIT for Barge Dock Area is fifteen (15) MPH.

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8. When performing work in or on leased property or equipment, Carbide Safety Rules and Safe Practices will be adhered to; also, any rules or safe practices required by owner.

9. Caution should be used when moving material or walking in high grass to avoid snake bite. Occasionally, poisonous snakes are found.

10. Life jackets must be worn when working on deck of barge.

SAFE PRACTICES FOR ELECTRICAL DEPARTMENT

1. Each employee shall be qualified, as to experience and general knowledge, to perform the particular work to which he is assigned.

2. A thorough survey shall be made by the workman to determine all the hazards present and to see that all necessary safeguards are provided to protect himself and other workmen.

3. In all cases where the work is hazardous, there should not be less than two (2) workmen together and if one workman should have to leave for any reason, the work shall be discontinued until both are present again.

4. Steel rules or any metal measuring tape are dangerous for electrical workmen.

5. Do not wear metal safety hat. Fiber hats are available.

6. Be cautious and alert at all times and under all conditions.

7. Never experiment or fool with electricity in any way.

8. Do not take any unnecessary risks even though the voltage is low. Avoid even slight shocks when in high places.

9. Remember it is possible to receive a fatal shock from 110-volt circuits.

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10. If you see any electrical equipment in an unsafe condition, or being improperly used, report the matter to the foreman.

11. Never handle electric wires while standing or sitting in a wet place. Use care to obtain insulation from the ground.

12. Never work on equipment in operation where there is a chance of being injured. Be sure that the power is turned off and that a safety tag and lock have been attached to the switch.

13. Never close a switch without full knowledge concerning the circuit and why the switch was open.

14. The insulation on electric wires cannot be depended upon to protect you from shock.

15. Switches, motors, generators, circuit-breakers, or other electrical equipment capable of causing a spark should never be placed in locations or areas where volatile, inflammable material is confined or likely to be present.

16. Rubber gloves are provided for electricians. They should be kept in good condition and always inspected before use. They must be worn by electricians when working on "live" wires carrying 440 volts or more.

17. High voltage signs shall be placed on all high voltage equipment.

18. As far as possible do not allow floors about any electrical apparatus to become wet.

19. (a) All fuses should be put in or replaced by an electrician.
    (b) See that all fuses are of the enclosed type.
    (c) Never bridge a fuse with wire.
    (d) See that all fuse boxes are kept closed.

20. When necessary to use soldering equipment in gaseous areas a hazardous permit must be secured.

21. Neutral conductors shall not be fused.

22. When working "live" circuits, care should be taken to work on but one wire at a time; all parts of the body should be properly insulated from the ground and from other wires of the circuit. Insulate each joint as it is made before starting in on another wire. Be sure you are protected from falling from scaffolds, ladders, etc., in case of shock. Careless haste, in working on "live" circuits, is the cause of most electrical accidents. Circuits should not be worked "live" unless absolutely necessary.

23. Portable cords should not be tied on metal rods or nails, nor allowed to come in contact with water or oil. They should be kept off the floor or ground where possible. Splices should not be used.

24. There are many special conditions which make electrical work dangerous. Telephone or signal wires may become crossed with high tension wires, thus becoming dangerously charged. Competent electricians are always careful and alert.

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25. If anyone should come in contact with live wires or cables and be unable to release his grasp on the wires, do not attempt to pull him off with bare hands. Shut off the current, if possible, and protect the hands with rubber gloves, or if they are not to be had, use thick folds of dry cloth to cover the hands before attempting to release the victim. If the wires are directly on top of the victim, use a dry stick to remove them.

26. Safety Groundings:

    (a) Grounding shall be in accordance with fire underwriters' rules.

    (b) Frames of all electrical machines shall be grounded.

    (c) All service switch boxes and conduit systems shall be grounded.

    (d) All wires should be drawn in metal tubing or rigid conduit.

27. Regard all electrical conductors as potential hazards.

28. Never use screwdrivers, etc., to actuate electrical switches until the proper safety measures are taken.

29. Avoid standing directly in front of disconnect switches when operating.

30. Remember that dirt and moisture are enemies of all electrical equipment—keep it clean and dry.

31. **CABLES**

No cable which is or has been in service shall be cut into without first taking the following safety precautions to insure no current flow or potential:

(a) Check with clamp-on ammeter.

(b) Check for voltage with a potential transformer and voltmeter; wear rubber gloves and use special probes provided for this purpose.

(c) Blanket cable to be worked on as well as practical before starting work.

(d) Even after the cable has been checked and found to be dead, rubber gloves must be worn by electrician when cutting cable. Use care to insure that only the rubber gloves contact cutter.

ROWAN CONTROLLERS

Where safety jacks are provided, they must always be removed before tank is lowered and not replaced until tank is raised.

E. P. C. & SPINTOP

Where this type enclosure is used, line coupler should be removed before any work or testing is done on controller.

NOTE: Line couplers are not to be used on controllers used with motors rated above 40 hp.

Line coupers are not to be used as a load breaker.

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SAFE PRACTICES FOR EQUIPMENT OPERATORS

1. Each mobile crane has a detailed load chart showing capacity of main load line and jib in relation to boom length and radius of lift. These capacities shall not be exceeded without specific authorization of the Equipment Foreman or the Maintenance Superintendents' Department.

2. Jin poles and derricks should be checked by your supervisor for safe working loads. If there is any doubt, the Engineering Department should be consulted.

3. Ropes, chains and cables must not be used if defective. Keep your equipment in good condition.

4. Hand ropes (guides) should be attached to the hoisting tackle and not to the sling.

5. In uncoiling wire rope, it is important that no kinks are allowed to form, as once a kink is made no amount of strain can take it out, and the rope is unsafe.

6. Exercise every effort to prevent anyone from walking under suspended loads or in the vicinity of lines holding a strain.

7. Hoisting machine or crane operators must be continually alert and must keep their eyes on the man giving signals.

8. Examine boom lines and hoist ropes frequently. Give careful attention to the section passing over equalizer or compensating sheaves.

9. Wire ropes should not be used if more than three outside adjacent wires are broken within a length of one lay, or if outer wires are worn two-thirds of their original diameter, or if marked corrosion appears.

10. In attaching cable to the drums, the end of the cable must be looped around the thimble and the end clamped down tightly to the drum.

11. Stay on rig if boom strikes high voltage wires. If you must leave cab, jump. Do not climb down while rig is still carrying current.

12. Personnel will not be permitted to ride headache ball except under special conditions and with the permission of the heavy equipment supervisor.

13. In cases where a load is to be lifted in excess of load chart capacity, or crane has to be walked with a load, specific approval must be obtained.

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DRAVO CRANE EMERGENCY HOIST SWITCH

"I **Purpose:** To allow the hoisting of a box with the hoist relay open and the amber light off.

"II **Use:**

A. This switch is to be used only when:

1. The spreader is latched on a box and the amber light goes off (the hoist (R) relay opens), AND
2. It is undesirable or impossible to immediately lower the box to a safe, firm support.

B. This switch will reset the S. P. relay and allow the box to be raised or lowered without affecting the corner latches. It will be impossible to unlock from the box with this switch in the emergency position.

C. To use the switch, break the seal and remove the glass cover. After the load has been released on a firm support, return the switch to the original position, replace cover and return to normal operation. If normal operation is impossible, electrical difficulties of a more permanent nature are present and special assistance will be required. Report every use of this switch to heavy equipment supervisor."

SAFE PRACTICES FOR FIRE PROTECTION DIVISION

1. When testing fire hose, be sure all air has been removed.
2. Always check with Operating Department before testing fire protection equipment installed in a unit.
3. When charging CO_2 extinguishers be sure all connections are tight, and observe weight. Do not fill cylinders liquid full.
4. When working on foam chambers on storage tanks, safety belts must be used.
5. Keep tools clean; use proper tools for job.
6. When removing deluge valve from sprinkler system, chain hoist should be used.
7. Never take fire equipment out of service until the proper persons are notified.
8. Observe plant traffic rules.
9. Before testing an underground fire line, be sure it is adequately supported, rodded and braced at turns.

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SAFE PRACTICES FOR OPERATING INCINERATOR

1. Face masks, asbestos aprons and foot guards should be worn at all times.
2. Salt tablets should be taken each day.
3. Fire hose and extinguishers are available at all times. If you do not know how to use them, ask your supervisor.
4. Trash should not be allowed to build up on the platform at the loading door of incinerator due to the possibility of the trash catching on fire and spreading.
5. Employees working at the incinerator will not leave the incinerator when the platform is full of burnable trash.
6. Do not stand under or near a bucket that is being dumped on the platform.
7. Do not attempt to adjust gas or water lines. Report any damage or malfunction immediately.
8. No liquid material is to be put in the incinerator.
9. All trucks carrying questionable material to the incinerator should be referred to the supervisor in charge of the incinerator.
10. Never walk on top of a stack of scrap lumber or trash.
11. Asbestos gloves should be worn when there is a danger of possible burns to the hands.

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SAFE PRACTICES FOR INSTRUMENT DEPARTMENT

1. Wear safety hats at all times unless in Instrument Shop or offices.
2. All piping and equipment must be clean and gas free before being delivered to the shop for welding or other repairs. When this is not possible, the shop must be notified and the hazards remaining mutually understood.
3. Use proper tools for job; keep tools in safe working condition.
4. When blowing leads containing corrosive or toxic materials, see that proper warning signs, or ropes, are placed around the area at the ends of the leads that are being blown.
5. Keep all mercury in covered containers at all times. Use it only in well ventilated rooms. Do not get mercury in mouth, eyes, or get it into open sores or wounds.
6. When using hose for blowing leads be certain that the hose will withstand the pressure of the purge gas used.
7. Do not attempt to clean up spilled mercury by blowing it with an air hose.
8. Do not attempt to plug off blowing leads with fingers or other parts of the body.
9. When blowing instrument leads, they should be disconnected from piping or equipment unless disconnecting creates a greater hazard.

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Each case should be considered separately. If there is any doubt, check with your supervisor.

10. When opening leads treat them always as if they had pressure on them. Always bleed pressure off before working on instruments or their accessories.

11. Use standard Meriam manometers on services only when the pressure is 75 p.s.i.g. or less.

12. Always contact operator on starting and completion of job.

13. Never use oil or grease on equipment in oxygen service.

SAFE PRACTICES FOR INSULATION DEPARTMENT

1. Insulators, apprentices and leadmen must be sure they understand the job instructions before commencing work.

2. Insulators and apprentices should keep knives in scabbards when not in use.

3. Use proper tools for each job and keep them clean. Avoid tying or pulling wires overhead which might cause tools to slip and injure face or hands.

4. When working on hot lines take precautions against burns.

5. Wear goggles on all close work, lacing up lagging, cutting insulation, removing old insulation and on all similar operations.

6. Do not insulate lines, fittings, stills or towers where there are leaks. Be sure all bolts are in place and tight before covering any equipment.

7. Bend all wires, lacing and reinforcement to avoid exposed ends to prevent scratches and other injuries.

8. Extreme caution must be used when working near electric wires or electric equipment.

9. Keep scaffold floor and boards clean all the time.

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SAFE PRACTICES FOR LABOR DEPARTMENT

1. When several workmen are lifting an object together, see that all are agreed on given signal to pick up or throw down. Avoid placing a strain on one man or throwing load on him.
2. In excavating work or in filling in, observe the proper distance between the fellow in front and behind as you might strike him with the shovel or pick, or get hit yourself.
3. In working with wheelbarrow, don't overload or run off runway. Watch the fellow ahead; don't run wheelbarrow over his heels.
4. Before chipping, drilling, or breaking concrete in the vicinity of process equipment, permission must be secured from the Operating Supervisor, and goggles must be worn.
5. Excavations must be covered or properly guarded before being left.
6. When working around acid or caustic spills, or when handling acid sludges, wear rubber gloves and rubber boots and see that they are in good condition.
7. Make sure when chipping concrete that area to be chipped is free of electrical conduit.
8. In working around concrete mixers, stand so that cement dust is blowing away from you. Wear goggles. Wear a dust respirator when dumping cement bags.

THINK! BEFORE YOU ACT!

9. All trenches and excavations should be properly and securely shored and braced where necessary to provide safe working conditions. Such bracing shall be done in accordance with accepted standards.
10. Excavated material shall not be placed nearer than one (1) foot to the edge of any excavation.
11. All trenches five (5) feet or more in depth shall be provided with ladders, or their equivalent, conveniently spaced.
12. Carry hand tools such as shovels, picks, bars, etc., in hand, not over shoulder. The man behind you may not see the end of tool.
13. You are responsible for your own safety and the safety of your fellow workman. Call your fellow employees' attention to unsafe conditions and unsafe acts.
14. Look-out procedure MUST be followed before entering autoclaves.

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SAFE PRACTICES FOR LEADBURNERS

1. Tanks in which leadburning operations are carried on should be ventilated with either exhaust fans or blowers. For this purpose, it might be necessary to use existing pipe connections. Portable blowers with flexible hose which can be lowered into the tank are especially recommended.
2. All clothing, including underwear, should be changed after work.
3. All working clothes should be washed weekly.
4. At least ten (10) minutes should be provided, on company time, for adequate washing, including an obligatory shower and paying particular attention to the face, hands and arms.
5. Eating, smoking and chewing tobacco while at work shall be prohibited.
6. Scrub hands and face well before eating lunch.
7. All Lead Shop employees should have physical examination annually.
8. Acid should be stored in safety containers and caution should be used in handling.
9. Park cylinder buggies in a safe location.
10. Never store cylinders in operating area.
11. Carry adequate fire extinguishers on any job requiring open flame.

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THINK! BEFORE YOU ACT!

12. Always remove torch from vessel where flame is shut off for more than a few minutes.
13. Anytime you are not sure the material or equipment is satisfactory for the job, check with your supervisor.
14. Take your hose into any vessel through the manhole—not through a nozzle.
15. Disengage the striker or remove your friction lighter from person when passing through areas where gas may be present.
16. When leadburners are assigned to field work in an area where hazardous conditions exist, the Maintenance foreman in charge of the job will be present when flame is ignited.

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SAFE PRACTICES FOR ROSS FORK LIFT

1. Only those persons who have been properly instructed and checked out in its operation will be permitted to operate the vehicle.
2. Test brakes, controls and horn before putting the machine to actual use.
3. Do not operate the truck when your hands or feet are wet or greasy.
4. Plan your load—size it up before picking it up. Keep the load balanced so nothing is likely to shift or fall.
5. Make certain that both forks are under the load before lifting.
6. Keep the load below eye level—you must always have a clear view ahead. This means that at times you must travel in reverse with the load behind the unit.
7. Always tilt the load toward the truck before lifting.
8. Never carry a load in an elevated position. The load should be as close to the floor as possible.
9. Watch overhead clearances.
10. Place forks flat on ground when truck is parked and not in use.
11. Do not use the truck as a personnel elevator.

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THINK! BEFORE YOU ACT!

12. Operate the truck at safe speeds.
13. Never push another truck or piece of freight with the ends of the fork.
14. Watch for unstable loads and stacks.
15. Report evidence of faulty truck performance to your supervisor.
16. Stop motor before refueling.
17. Park on pipe rack side of road.
18. Look before you start. Be sure that there is no person or object in the path of your truck, not only at leg level but also at head level, particularly before backing. Take a look before backing out from under a load.
19. Report every collision to your foreman. Even if no damage is done, the causes of all collisions with other trucks, with persons or with other objects should be determined and corrected.
20. Stop and kill engine when fire alarm sounds.

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SAFE PRACTICES FOR MACHINIST DEPARTMENT

1. Remember first of all to wear your safety glasses on all jobs.
2. If you operate a power machine, be sure you know its mechanism completely.
3. Never change or adjust a machine being operated by another workman, unless he approves.
4. Never wear loose fitting clothes or gloves, long or torn sleeves, or neckties; they may catch in machine and pull you into it before the machine can be stopped. Finger rings are dangerous and should not be worn.
5. Employees should not use unsafe tools, machinery or equipment. Report these to your foreman at once.
6. Do not lift heavy objects; cranes are available for this job. Be sure crane hook is properly attached before lifting.
7. Keep your work bench, work area and aisle clear at all times.
8. Where guards are provided for the machine you are to operate, be sure they are in their proper place and in good operating condition.
9. Do not attempt to operate a machine until you have acquainted yourself with operating switches.

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10. Do not stand directly in front of press when using block or in line of work when pressing off tapers.
11. Do not use emery wheels out of round, or stand in line of high speed wheels.
12. Work must be securely clamped to the table or in a jig or chuck. When part is held in hand, an accident is likely to occur should the drill catch or stick.
13. Never use rags around moving machinery.
14. When operating machines, keep hands and fingers in the clear.
15. Use a brush to remove chips from drill or machine mills. Never use your hands.
16. All piping and equipment must be clean and gas free before being delivered to the shop for welding or other repairs. When this is not possible, the shop must be notified and the hazards remaining mutually understood.
17. In making repairs to all pumps, get an OK from the operator in charge and be certain that lines are blown out and drained and properly blanked off.
18. Specific work requires a specific tool. Any one type of hammer, wrench or other tool has a limited use. Know your tools and use the proper ones for the job.
19. Replace guards or any other safety device that you remove from equipment before leaving the job as completed.

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20. When removing compressor heads, loosen all nuts slightly, then break gasket seal to allow any trapped pressure to bleed off gradually. This will prevent a head suddenly flying off.
21. All grinding wheels have a maximum safe operating speed. Do not exceed its rated capacity. If in doubt, check with your supervisor.
22. Copper-bearing thread and gasket dope should not be used.
23. When required to place hands or arms in a compressor cylinder, an aluminum safety block must be used to block piston.
24. Compressor flywheels should be locked or blocked before working in the crankcase.

SAFE PRACTICES FOR ALL OPERATORS OF MOTOR VEHICLES

1. ALL OPERATORS OF MOTOR VEHICLES:
   (a) Are to have a Texas Operators License.
   (b) Are not to exceed plant speed limit of fifteen (15) miles an hour.
   (c) At the sound of fire alarm whistle or unit alarm, are to pull over to the side of road (pipe rack side of road on all north and south roads), shut off engine and remain parked until all-clear signal is given.
   (d) Are not to permit passengers to get on or off vehicle while in motion.
   (e) Are to see that all passengers are seated while vehicle is in motion.
   (f) Are to refuse to operate any motor vehicle with faulty brakes, steering, windshields, or any condition that might endanger lives or property and report any of the unsafe conditions to the Garage immediately.
2. Do not operate any motor vehicle beyond a hazardous sign without first securing a permit to operate in such area and be sure that the permit covers that particular vehicle.
3. One (1) passenger only is allowed in cab of trucks with power take-off controls in cab.

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4. Use the common courtesy of the highway at all times.

5. Vehicles owned by the Company are not permitted to haul passengers outside of plant except those on Company business.

6. When transporting welding machines, air compressors or trailers outside of Plant, safety chains must be used in addition to regular hitch.

7. Operators of motor vehicles are not to push one vehicle with another. Always use tow line.

8. Everyone driving a Company-owned motor vehicle must be familiar with the state, county, and local traffic rules and regulations.

9. When driving Company trucks or cars on the highways never pick up hitchhikers or offer rides. To do so is to increase the Company's liability in case of an accident.

10. If involved in an accident secure all the facts and write them down; age, sex and address of all persons involved; names and addresses of witnesses; location of accident; time; weather; road condition; extent of damage. Report immediately to Garage foreman. Direct inquiries to Company officials; make no statements, sign no papers on your own authority.

11. A red signal flag must be used on any truck load that extends beyond the side, front or rear of truck.

12. The driver of a loaded vehicle shall not permit anyone to ride on the load if, in his opinion, it is unsafe to do so.

13. The driver shall clearly signal his intention of turning or stopping by using hand signals.

14. No one shall be permitted to ride on the fenders, running boards, top or bumpers of vehicles. Passengers must keep all parts of their bodies inside the vehicle. Drivers are responsible for the enforcement of this rule.

15. Vehicles having cardboard or other opaque materials substituted for front, side or rear windows shall not operate in the plant.

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SAFE PRACTICES FOR OILERS

1. Never wear loose clothing when working around operating machinery.
2. After using oil or grease, always wipe up spillage.
3. DO NOT REMOVE OR REPLACE coupling guards while equipment is running.
4. Never put hand behind safety guards while machinery is running.
5. Always put nipples on grease fittings that are in close, hard-to-reach places.
6. Never attempt to replace fittings in close places while equipment is running.
7. Always be particularly careful about spilling oil while draining or filling because of the hazardous conditions that may prevail.

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SAFE PRACTICES FOR PAINT DEPARTMENT

1. Stages must be lowered to the ground and rope falls must be placed in metal drums and covered when work is finished for the day.
2. Sandblasters must equip themselves with airline equipment or respirators for sandblasting.
3. Use nonsparking tools to loosen rust in ALL areas where Hazardous Work Permit is required.
4. Test and inspect ropes, hooks and blocks, before putting into use.
5. Your eyes are most valuable to you; wear goggles when chipping, brushing or painting.
6. Guard against poisoning from paint ingredients. Read label on can; check with your supervisor.
7. Beware of live wires. Don't paint on switchboards or near electrical equipment until the proper Hazardous Work Permit has been obtained and safety precautions abided by.
8. Do not paint hot surfaces where the temperature exceeds 175 degrees F., except with an approved type of paint and upon instructions from your supervisor.

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9. Spray painters must equip themselves with approved type respiratory equipment when spray painting.

10. Never leave oil- or paint-soaked rags in overall pockets or wadded up. Place all such rags in covered metal cans.

11. Air horns must be used in addition to approved respirators when painting inside vessels or other confined space.

12. When using pressure pots always double check to make sure the lug bolts are in perfect shape and properly tightened.

13. Before using spray equipment, inspect hose and connections to be sure they are all in good shape.

14. Use care not to strike someone when carrying ladders. especially when you are carrying it around a corner or approaching a corner

SAFE PRACTICES FOR PIPEFITTERS

1. All piping and equipment must be clean and gas free before being delivered to the shop for welding or other repairs. When this is not possible, the shop must be notified and the hazards remaining mutually understood.

2. In lifting, lowering or carrying a load, coordination is essential. Keep in time with others. One man should act as signalman. Lift or lower pipe at a given signal. Work together. Accidents occur when one man lifts or lowers a load before the others are ready.

3. Keep hands out of end of pipe at all times.

4. Keep feet and hands from underneath pipe when it is lowered to any position.

5. When stabbing, keep hands out of pipe and make sure that threads are caught before letting go. In supporting pipe for makeup, keep hands clear of threads. All pipe too heavy to handle should be securely blocked up.

6. Use good tongs or wrenches. See that jaws are sharp and chain or straps are in good repair.

7. Use copper wire brush to remove cutting from threads.

8. When working from scaffolds or overhead, see that no one is working underneath or passing by that will likely be hurt from something

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falling. Do not throw or drop tools or materials from above.

9. All men should keep clear of suspended loads.

10. Employees should be on the lookout for leaks, defective ladders, railings, steps, tools, etc., and all unsafe conditions. Report them to your leadman or foreman.

11. When using tools in gaseous areas, tools made from nonsparking metals are to be used. Under such conditions, steel against steel, iron or concrete should not be used. In cases where special tools are not manufactured of nonsparking metal, a water hose must be played on tool or other precautions taken as specified in Hazardous Work Permit.

12. When using a wrench, be sure the wrench fits the nuts and in applying force, use care. Where possible, pull and do not push wrench.

13. Do not use two open-end wrenches to secure leverage by placing the jaws of one on the handle of another.

14. Do not open any pipe line without permission from the Operating Department. Be sure line is properly tagged out.

15. Break all flanges on the off side where contents of line will not spray or blow on you. Wear the proper protective equipment.

16. Loosen all bolts and spread flange carefully. Be sure the pressure is off the line before removing any bolts from flange.

17. Avoid breathing vapors or fumes that may be harmful. Always keep to the windward side and use proper protective equipment.

18. Do not use plant air for breathing purposes. Use air horns to evacuate air from equipment; never blow air into equipment.

19. Do not stand on wrench handles.

20. Do not pop off grating clips with a spud wrench. Remove them in the proper manner.

21. Use the proper rigging. A hand line won't do the work of a chain fall. Keep line out of acid and test frequently.

22. Line up holes with spud wrench or drift pin. Keep fingers out of flange holes. Keep hands or fingers from between flanges at all times.

23. Do not use pipe on wrenches for extension handles except on those especially designed for that purpose. Wrenches are designed for the leverage provided by their handles and use of extensions cause slipping and damages the wrench.

24. Hard hats should be worn at all times.

25. When lowering pipe with handlines be sure hitch is secure and will not slip off end.

26. Do not use acetone or other solvents to wash hands or clean clothes and gloves.

27. Do not wear greasy clothing. In case of fire you could be a human torch.

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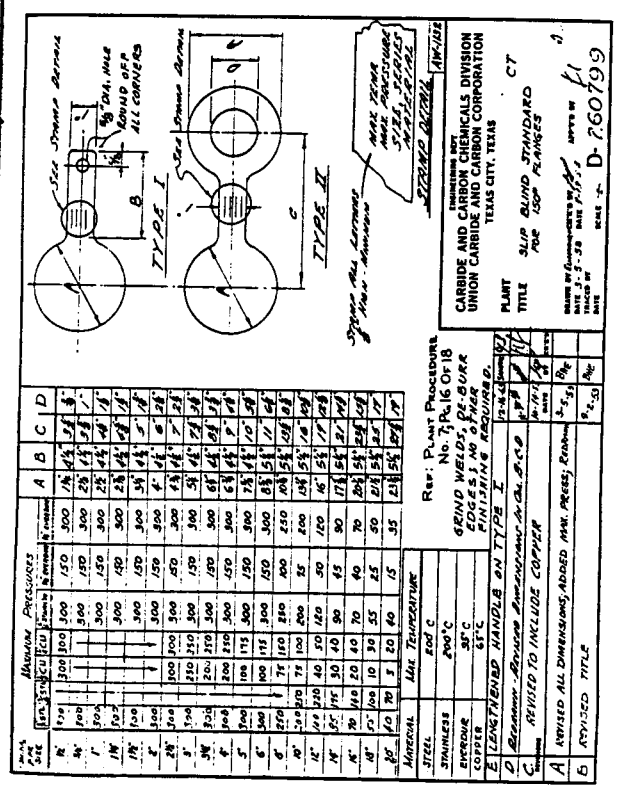
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28. When a hammer is needed, use a hammer, not a spud wrench or other makeshift device.
29. All pipe machines and portable electric tools must be properly grounded.
30. All slip blinds must have handles that extend well beyond the outer edge of flanges.
31. Copper-bearing thread and gasket dope should not be used.
32. Use skin cream when exposed to irritating vapors and liquids such as dripolene, etc.

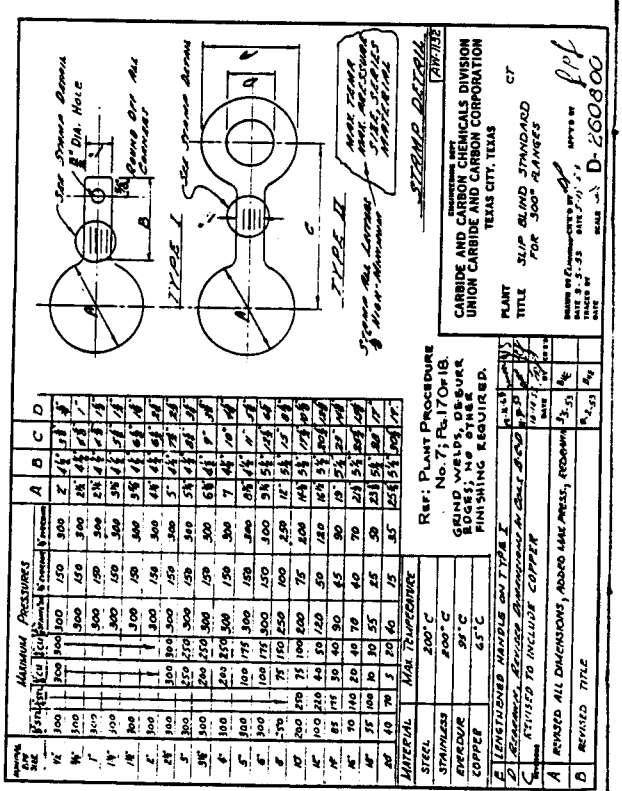
See Drawings

On Next Two Pages.

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SAFE PRACTICES FOR SALVAGE DEPARTMENT

1. Equipment should be tested for explosive mixtures or combustible mixtures before work is begun.
2. Safety shoes should be worn at all times.
3. Safety glasses should be worn at all times in cutting gaskets.
4. All gasket material should be wiped off with a damp cloth when removing from storage.
5. Pipe and equipment should be checked for former service to determine the possibility of acetylides or other hazardous contaminations.

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SAFE PRACTICES FOR SHEET METAL DEPARTMENT

1. In removing or handling old tin or corrugated iron sheets, wear gloves.
2. Goggles should be worn when soldering and when using acid for cleaning sheet metal surfaces, when making solder and melting lead, or when making roof ties.
3. When using buffer, keep guard in place as steel bristles may break and injure persons working some distance away. Proper eye protection must be worn.
4. When lighting gas pots or blow torches, never turn on the gas until you are ready with lighter. Do not hold your face over the pot.
5. In carrying oxygen or acetylene cylinders, use proper trucks provided. Never attempt to carry them on shoulders.
6. Defective oxygen and acetylene regulators are dangerous. Check them often for fractures and leaks.
7. Sharp or pointed pieces of sheet metal overlapping on tables are a hazard.
8. Tanks, floats or cylinders must be thoroughly purged with nitrogen and tested for explosive mixtures before any welding, burning or soldering. Plant air or oxygen should never be used to purge.

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9. Never enter any vessel, tank or column without a gas-free test. Always notify the Unit Head before attempting any work in columns.
10. Never attempt to carry loads up ladders. Use a hand line to carry loads and tools on roofs.
11. Never use any electrical motors, drills or shears in wet or damp places. Make sure there are no defective cords or plugs and that motor is properly grounded.

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SAFE PRACTICES AND PROCEDURES FOR STRUCTURAL STEEL SHOP

1. All equipment must be tested for explosive or combustible mixtures before work is performed.
2. Check items for copper acetylides. If there is any doubt call the Maintenance Area Foreman for check to see if test has been made. Keep item wet while waiting. If copper acetylides are present, have removed by area forces.
3. Check items with Maintenance Area Foreman to determine whether any self-igniting substances are present. This is found at times on tube bundles.
4. When handling items in the shop be certain that chain hoists or cranes are safe for the load.
5. Do not go up on the overhead crane or near its electrical power wires. Only authorized persons can get the key to electric power switch for the crane's operation.
6. Do not leave items hanging high by chain hoist unattended. Keep the items as close to floor level as practical and possible.
7. Wear goggles or safety glasses as work requires. Be careful of flying particles when grinding is being done by oneself or others.
8. Make certain temporary supports and rollers are set up safely while working on items.

9. Make certain that air horns remove air from an item—not blow it in.
10. Keep the floor clean and free of oils.
11. Keep all hose coiled and the portion being used lying flat on the floor.
12. Keep no flammable liquids in shop other than that in immediate use and then in Underwriters' approved safety cans.
13. Do not keep oily rags where spontaneous combustion will be a fire hazard.
14. Make certain shield or guard is used when grinding.
15. Do not overload punch press. The load schedule is on the side of the throat.
16. Keep passageways clear of equipment work. Use these passages for walking to eliminate jay walking and possible injury to personnel.
17. Be certain that grinding wheels are equal to the RPM put out by the motor. Handle grinders carefully to avoid damage to wheels which might cause them to burst while operating.
18. Be certain that all electric motors are properly grounded.
19. When using potassium cyanide in carburizing tools, etc., be certain that the fumes are not breathed as they are deadly poisonous.

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20. When burning steel plate over one and one-quarter inches in thickness on top of shop horses, a plate shall be placed directly under the plate being cut and on the concrete floor to catch the molten slag. This will prevent the molten slag spalling the concrete floor, with possible injury to personnel and definite injury to the floor.

21. Make certain that all machinery is provided with proper guards.

22. Equipment in the shop should be operated by authorized personnel only.

23. Use safety shoes and proper clothing.

24. Be sure not to breathe fumes from fluxes used in welding or brazing.

25. Wear dust respirators when drilling Karbate tubes.

26. Wear rubber gloves while using carbon cements.

27. Copper-bearing thread and gasket dope should not be used.

SAFE PRACTICES FOR TEST AND INSPECTION DIVISION

1. Avoid using C. I. flanges and fittings for testing.

2. Do not use air or oxygen as a testing agent on used equipment.

3. Allow suitable vent at top of equipment, being sure that all air has been removed before applying hydrostatic test.

4. An inert gas test should be applied only after obtaining special permission.

5. Fill equipment near base, if possible, when preparing for hydrostatic test.

6. Install sufficient and proper test gauges.

7. When removing water after test, allow adequate vent at top of equipment.

8. Keep tools and test equipment clean and in good working order.

9. Always wear safety glasses, hats, and have acid goggles on person when in acid area.

10. Use slip blinds of proper thickness for pressures desired.

11. Obtain Hazardous Work Permits before entering equipment or using non-explosive proof equipment.

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12. Be cautious of acetylide in equipment or piping.
13. Check with Supervisors, both Maintenance and Operational, before starting and upon completing a job.
14. All test gauges shall be tested as per standard test precedure.
15. When testing safety valves NEVER stand in front of discharge of valve. NEVER install safety valve with discharge where it may be injurious to personnel or equipment.
16. Always test oxygen gauges and safety valves on special oxygen testing equipment.
17. Never increase or lower setting of safety valve without the proper authorization.
18. Never attempt to test a piece of equipment without comparing work sheet with name plate data.
19. Copper-bearing pipe thread and gasket dope should not be used.
20. Check condition of fittings, bolts and supports when servicing or inspecting safety valves, rupture discs, vents and gages.

SAFE PRACTICES FOR TOOL ROOM

1. Check all incoming tools. If in need of repair put aside to be repaired; if beyond repair place in junk bin.
2. Use step ladder to place boxes of tools and repairs in upper bins.
3. Keep a clean floor (removal of oil from floor).
4. Stack tools properly in bins.
5. Be sure mechanics know the correct R.P.M. of tool being used before issuing grinding wheels.
6. Work at all times with all foremen to improve Plant Safety.
7. Issue safety washers with all grinding wheels. All grinders must have guards.
8. When using the plastic dip pot, be sure you understand and have read the operating instructions.
9. Where sharp or pointed tools are present, look before reaching into bin.
10. Know the limitation of tools.
11. All air tools and lifting devices should be ininspected and tested to full capacity.
12. Safety instructions should go with tools when needed.

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SAFE PRACTICES FOR WELDERS

A. GENERAL

1. When welding or burning in a position where hot metal may enter the ear, ear plugs or some other suitable material must be placed in the ear opening. Ear plugs may be obtained from the Plant Medical Division.

2. When welders are assigned to field work in an area where hazardous conditions exist, the maintenance foreman in charge of the job will be present when flame is ignited. The leadman assigned to the area will also be present.

3. When any tank, pipe line or any hazardous piece of equipment is to be welded on, or in, the welder must be accompanied by a responsible person from either Operating or Maintenance Departments. This person is to remain close at hand to render all necessary assistance.

4. When welding is to be performed in restricted areas of the Gas Area, purge gas from the purge gas system should be used for bulk purging only. If further purging is necessary while the actual welding is being done, use bottled CO_2 as a safety precaution against the possibility of using contaminated purge gas from the system.

5. The use of oxyacetylene and electric arcs for cutting and welding is accompanied by invisible light rays which are injurious to the eyes. Operators must wear dark glasses in shields or goggles.

6. Protect yourself and others working nearby from reflections by using canvas screen. Do not allow anyone to watch you at work unless he is properly equipped with shields or goggles.

7. In electric welding, all parts of the body should be covered to prevent skin burns from ultra-violet rays.

8. Guard against poisonous gases generated by faulty combustion or volatilized by heat. Lead, paint and poor ventilation are common hazards. When burning in a confined area wear a suitable respirator.

9. Always carry a fire extinguisher in good order as part of your equipment.

10. Use protective devices to avoid burns from hot scale. Protect the head and ears when doing overhead work.

11. When cutting or welding in high places, have some method of catching hot metal, electrode stubs, etc.

12. A Hazardous Work Permit must be obtained before doing cutting, welding or other hot work outside of designated areas. Where extra precautions are necessary, the Operating Department should be consulted.

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13. Cutting or welding must not be done using an empty cylinder, barrel or drum as a work bench.

14. Always take your torch or cable into a vessel through the manhole and not through a nozzle.

15. Remove your torch from inside a vessel as soon as it is extinguished. A leaky valve can result in a dangerous condition.

16. Disengage the striker or remove your friction lighter from person when passing through areas where gas may be present.

17. All burning and welding on pipe in pipe racks should be done only after each point on the pipe has been properly marked where cutting or burning will be done. This marking should be done co-operatively by the operating supervision, the craftsman doing the job and the maintenance foreman.

B. OXYGEN-ACETYLENE OPERATORS

1. Keep equipment and valves in good order. Leaking gas is the most serious fire hazard; oil or grease should never be used on valves or fittings of oxygen cylinders.

2. Empty cylinders should be removed from job before resuming operations. Keep oxygen and acetylene cylinders separated whether empty or full. Keep cylinders in as cool a place as possible.

3. Handle cylinders carefully. Slings are not to be used for lifting cylinders. Rough handling causes leaks. Do not attempt to repair leaky valves—remove to open space away from fire or workmen. When regulators are not attached to cylinder, cylinder cap must be in place.

4. Never place acetylene torch in tool box while hoses are still connected to source of supply.

5. Test gauges frequently; inspect hose and fittings; keep your equipment clean and tight; avoid crossed threads. Never force connections.

6. Keep hose clear of falling hazards; do not allow hose to be a tripping hazard on stairs or walkways.

7. Shut off valves on torch immediately after a backfire; first the oxygen, then the acetylene. Never put down a torch until gases have been completely shut off.

8. Keep cylinder valves closed at all times when torch is not in at least intermittent use. An acetylene cylinder wrench should be left on the cylinder at all times for emergency shut off. Valves should not be opened further than actually necessary to do job.

9. Never allow oxygen to strike an oily surface or come in contact with oil or grease. Fatal explosions have been known to result. Keep gloves and clothing free from oil.

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10. Provide for free access to cylinder valves wherever possible so they may be reached quickly.
11. Blow out hose and torch when putting new cylinder on the line.
12. Torches must be lighted from patented lighter.
13. Keep cylinders upright. Acetylene cylinders should never be placed in a horizontal position.
14. In opening the valve, employees should stand to one side and away from the front of the regulators and pressure gauge. A hammer should never be used for opening cylinder valves.
15. Cylinders should never be taken inside of the container upon which work is being done.
16. Armored hose should never be used. The sheath of armor prevents proper inspection of the underlying rubber, and may cause sparks.
17. When working in a confined space, care should be taken to see that no compression gas or oxygen escapes into that space. Leakage of compressed gas may result in an explosion. Free oxygen will be readily absorbed by clothing and subsequent contact of a spark with the clothing may result in serious burns.
18. Report any acetylene or gas leaks smelled. Be certain valves are shut off tight when oxygen or actylene are not in use.

19. Should any cutting or welding be done on galvanized steel be certain that ventilation in area is good.
20. Always have oxygen and acetylene cylinders secured to portable buggies.

C. FURNACE WELDERS

1. A welder is not to start working on a furnace until he checks with the Operating Department.
2. Before starting cracking set repairs, the welder is to stand to one side, light his torch and flash the open ended furnace and the cracking set outlet tube.
3. The welder is not to weld on a set with the inlet and outlet tubes plugged off.
4. When the repairs have been completed, (set on repair cart). the welder is to purge out the set. This will dispose of any gas that might have collected during the welding process.
5. When purging out, purge very slowly.
6. When testing, do not stand directly in front of test plug.
7. When testing a preheater section that has been slip blinded the flange should be opened and separated to allow the section to be purged. After this has been done, the flange can be tightened to apply the test.

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8. By having the proper combustion at the torch, the amount of acetylene released into the inside of the tube can be minimized.

9. Goggles should be worn at all times a set is being removed, repaired or installed. This will prevent eye injuries due to scale popping off of tubing.

10. When removing or installing a cracking set, the buggy should be securely fastened by attaching it to the back of the furnace with the bars provided and by inserting the locking pins in the wheels.

D. ELECTRIC WELDERS

1. Machine ground should not be made to handrails, stairs or to projections from receiving houses, pump houses, steel power or lighting tower, or on any active oil, gas, steam, air or chemical line. Grounds should be made the shortest distance from the job. Work grounds shall be made to the object being worked on.

2. Arc welding sets must be located and placed free from vapors. When placed in the vicinity of operating equipment, the locating must be approved by the process operator in charge of the equipment.

3. An employee assisting an electric welder must be provided with protective eye equipment.

4. Gloves, shoes and clothing in general should be kept dry and in good condition. When working in moist places, adequate dry footing should be provided.

5. Stationary arc welding equipment should be located in a well ventilated shop or should be enclosed. The interior should be painted a dull black to prevent reflection of injurious rays from the welding arc.

6. Motor generator welding units of either stationary or portable type should be enclosed by suitable housings or guards to protect employees.

7. Portable welding units should not be moved until the power is shut off.

8. Temporary power lines to portable arc welding machines should be carried overhead wherever practicable.

9. Before plugging in or removing the 440-volt connection, the power line switch should be opened to prevent a flash. Care should be taken to see that the 440-volt plugs are kept dry and that all cable sections are properly joined and kept dry. When operations are discontinued during the shift, the power line switch should be opened to shut off the power. At the end of the shift, the machine should be disconnected at the main power source.

10. Lead and ground cable should be maintained in good condition and repairs should be made as soon as the insulation shows signs of breaking.

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11. Care should be taken to establish a tight work ground connection, preferably by tack welding to the container or equipment as near as practicable to the place where the welding is to be done.

12. The location of grounds for welding in any area where a Hazardous Work Permit is required should be selected jointly by the welder and the individual responsible for Hazardous Work Permits.

13. The number of ground connections at any one point should be limited to one in order to avoid the generation of excessive heat.

14. All welding machines, including motor and generator frames and starting box, should be interconnected so as to form a permanent ground and the entire unit should be grounded, preferably to the power conduit by means of four-wire cable, plug, and receptacle.

15. All equipment should be disconnected and isolated before any welding, burning or other spark producing work is started. Exceptions to this must be approved by the Maint. Supts. Dept.
Slip blinds or double valve and vents do not isolate the equipment for this type of work.

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IF IN DOUBT CONSULT YOUR FOREMAN.

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THINK

and avoid accidents

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