



GUIDELINES FOR PROTECTIVE CLOTHING



TX TINER
RMC0064954



DOW CHEMICAL U.S.A.

MAR 11 1978

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Mr. Bob Stasser
Reynolds Metals Company
6601 West Broad
Richmond, Virginia

Dear Bob:

Many thanks again for the cooperation and time both you and John spent with me last Thursday. I thoroughly enjoyed our discussion and am sure it will be helpful to me and the Dow safety effort.

Enclosed are copies of several of the guidelines we issue from the Dow U. S. Area Safety & Loss Prevention office. They are intended to keep uniformity in reporting and to be helpful to the local units in developing their own individual programs.

Again, thanks for your help - it is greatly appreciated.

Sincerely,



E. C. Friedrich, Director
U.S.A. Safety & Loss Prevention

AN OPERATING UNIT OF THE DOW CHEMICAL COMPANY



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New Film Promotes Use of Protective Clothing

The Dowell Division of the Dow Chemical Company has produced a film promoting the use of protective clothing to their employees. The film, "Up in Flames . . . and Live!" is the fourth in a series of safety-oriented films produced for Dowell by Creative Communications of New York. Dowell's 4,600 employees, engaged in services to the oil and gas industry, are provided Nomex clothing and are required to wear it as they perform their work.

The "man on fire" stunt scene—shown here and on this month's cover—was filmed at the Dowell facility in Downey, California. Other scenes were shot at the Sherman Oaks, California Community Hospital, the Alisa Ann Rugh Burn Center and at the Downey Fire Department.

The film is primarily for Dowell employee viewing, but will also be available for rental in the near future.



Counterclockwise, from below left: Stuntman dons protective outfit (Photo by Lyle Wilkinson); Crew applies flammable glue (Dow Photo); In flames & being extinguished (by Pat Olsen).



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GUIDELINES FOR PROTECTIVE CLOTHING

INTRODUCTION

Protective clothing has prevented numerous injuries to persons during emergencies while performing such jobs as lighting fires or closing valves to block in leaking lines. However, an even greater number of injuries has been prevented by persons wearing the proper clothing on the routine jobs they do each day. Unfortunately, people don't always use good judgment when selecting protective clothing, thus injuries still occur. This publication, therefore, presents some guidelines for proper protective clothing for various work situations.

1. POLICY

- 1.1 Dow Chemical U.S.A. is committed to the following guiding principles which can reduce injuries and prevent loss of life through the proper use of protective clothing.
- 1.2 All levels of local management within Dow Divisions and departments are expected to advise employees as to what is safe and proper clothing for their particular job.
- 1.3 Supervisors are also expected to furnish guidance in the selection and use of special protective clothing such as gloves, protective suits, or footwear used to protect against chemical, electrical or extreme temperature exposures.
- 1.4 Management will be responsible for seeing that company-furnished protective clothing is suitable for each job.
- 1.5 Each Dow employee is considered personally responsible for wearing the protective clothing furnished for the various jobs.
- 1.6 Equipment will be maintained in such a manner that personal exposure to such things as chemicals, harmful vapors or electrical hazards will be kept to a bare minimum. Knowing that in the best managed plants operational upsets can result in exposures, supervisors will designate the proper protective equipment required for various jobs including emergency activity.

2. PROGRAM ELEMENTS

2.1 Personal Clothing and Footwear

Good judgment should be used in selecting the proper personal clothing to be worn in your work area.

Examples of poor judgment would include such things as wearing:

- a. Shoes with high, narrow, or oversized heels, large buckles, or loose straps.
- b. Cloth shoes or open-toed sandals in such areas as chemical production, shop, or research.
- c. Clothing made of very flammable materials in high fire hazard areas. (Examples: polyester or polyester and cotton blends)
- d. Knee-length pants or short-sleeve shirts in areas where corrosive chemical, electrical flash, or fire hazards are found.
- e. Loose clothing or ties around moving machinery.

These hazards are pretty obvious. Improper shoes can lead to falls, crushed toes or burns from spills. Improper clothing is also a real hazard, particularly in relation to burns. Brushing against hot lines or vessels can melt or ignite highly flammable synthetic materials.

2.2 Footwear

Supervisors should insist that all employees wear footwear that is safe for their particular type of work. The following list shows the minimum shoe requirements that should be required for various work activity.

- a. General maintenance, production or research work requires a minimum of leather shoes in good condition, preferably with safety toes. (Shoes or boots with holes or broken soles should not be worn.)
- b. In areas where corrosive chemical hazards are found, safety toe rubber shoes or boots in good condition should be worn. Many chemicals readily penetrate leather shoes.

- c. In plants where electrical hazards are present, such as chlorine cells or on certain jobs such as work performed by electricians, rubber shoes or boots should be worn that are in good condition and tested for leaks. (Note: Visual inspection is not adequate, Appendix A shows one method used to test boots)
- d. On jobs where employees are engaged in frequent handling of objects that would severely injure an employee's foot if dropped, the metatarsal guard type shoe or boot should be worn.

2.3 Work Clothing

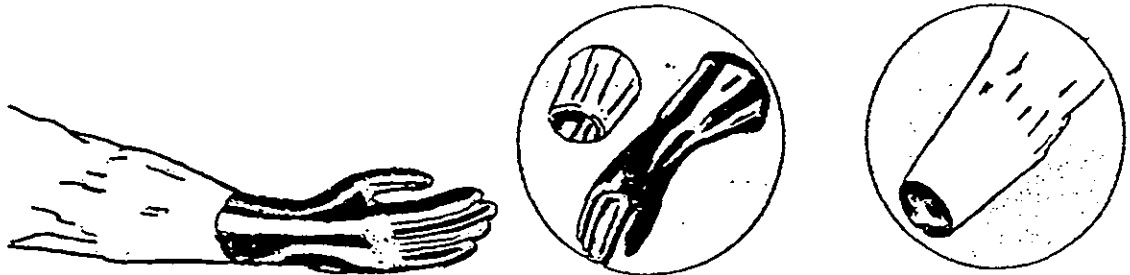
a. Fire Hazards

All employees and contractors working in plants where a process malfunction or other combination of events would expose them to severe burn hazards should have a minimum clothing requirement. Plants which utilize or process flammable materials at temperatures above their flash point, such as light hydrocarbon, refinery type units and some oil well jobs will be included in this category.

1. Minimum requirements should clearly state that employees and contractors working in such plants should wear long-sleeved shirts and pants or coveralls, made of material no more flammable than cotton.
2. Clothing with additional protective qualities should be required for more hazardous jobs, such as:

Flash protective clothing for operating open type electrical switch gear with available energy above 400 volts and 100 amps or for lighting furnaces. Slicker or chemical suits for unplugging lines or opening equipment containing corrosive or toxic products such as sulfuric acid. Flame retardant suits for pumping molten metal or sludging vessels containing molten salts. (See Appendix B)

3. Consideration should be carefully given to chemical protective clothing with respect to tested performance in exposure to a particular chemical. In many cases, tapered sleeves cupped to gauntlet gloves mean the difference between a serious chemical burn or no injury.



4. In chemical dust areas, avoid use of clothing with such things as fur collars, soft foam or leather that can trap corrosive chemical dust and result in burns.

2.4 Head Protection

Head protection shall be required in all plant areas where falling objects, material, or electrical installations could be a hazard to employees.
(OSHA Requirement)

Minimum hard hat requirements include:

- a. All hard hats issued to protect against falling objects, electric shock and burns shall meet the requirements and specifications of the American National Standard Z-89.1.
- b. Metal hats should not be used due to electrical hazards.
- c. Employees working in areas where they could possibly be exposed to more than 2,200 volts A.C. are required to wear Class B type hats. These hats will withstand 20,000 volts A.C. for three minutes. Class A and D hats offer limited electrical protection, 2,200 volts A.C. for one minute.

- d. All hard hats must be in good condition--no holes are permitted in the shell, metal bolts shall not be used to attach such things as ear muffs to the hat and all suspension points must be firmly attached.
- e. Bump or laceration caps can only be worn in areas where regulation hard hats are not required.

2.5 Slicker Suits and Gloves

Gloves and slicker suits are made from a wide range of materials and caution must be used when selecting the glove or slicker suit that offers protection against the wide range of hazards that can be found in a chemical plant. Published literature is helpful in determining the type of protective equipment suitable for your particular job, but this literature frequently implies far greater protection is offered than is the case. Therefore, Dow has been forced to run its own tests to determine the type of protective equipment best suited for company needs. Tests have not been completed for all chemicals and in many cases the person responsible for purchasing protective equipment must see that additional tests are made.

There is no one glove or slicker suit available that offers adequate protection against our wide range of chemical and electrical hazards.

Examples:

Dow laboratory reports show that PVC slicker suit material offers good protection against HCl and sulfuric acid, but does not offer adequate protection against phenol.

Neoprene slicker suits offer good protection against HCl, sulfuric acid and phenol, but do not offer adequate protection against such things as EDC or liquid chlorine.

The heavy duty PVC glove offers good protection against HCl and sulfuric acid, but does not give adequate protection against phenol.

The neoprene glove offers good protection against HCl, sulfuric acid and phenol but does not offer adequate protection against EDC.

The Buna-N glove also offers good protection against HCl, sulfuric acid and phenol, but cannot be used in areas where electrical hazards are found since it offers very limited protection against electrical hazards.

TX Tiner
RMC0064965

APPENDIX A

Dow Chemical U.S.A.

BOOT TESTER - ELECTRICAL

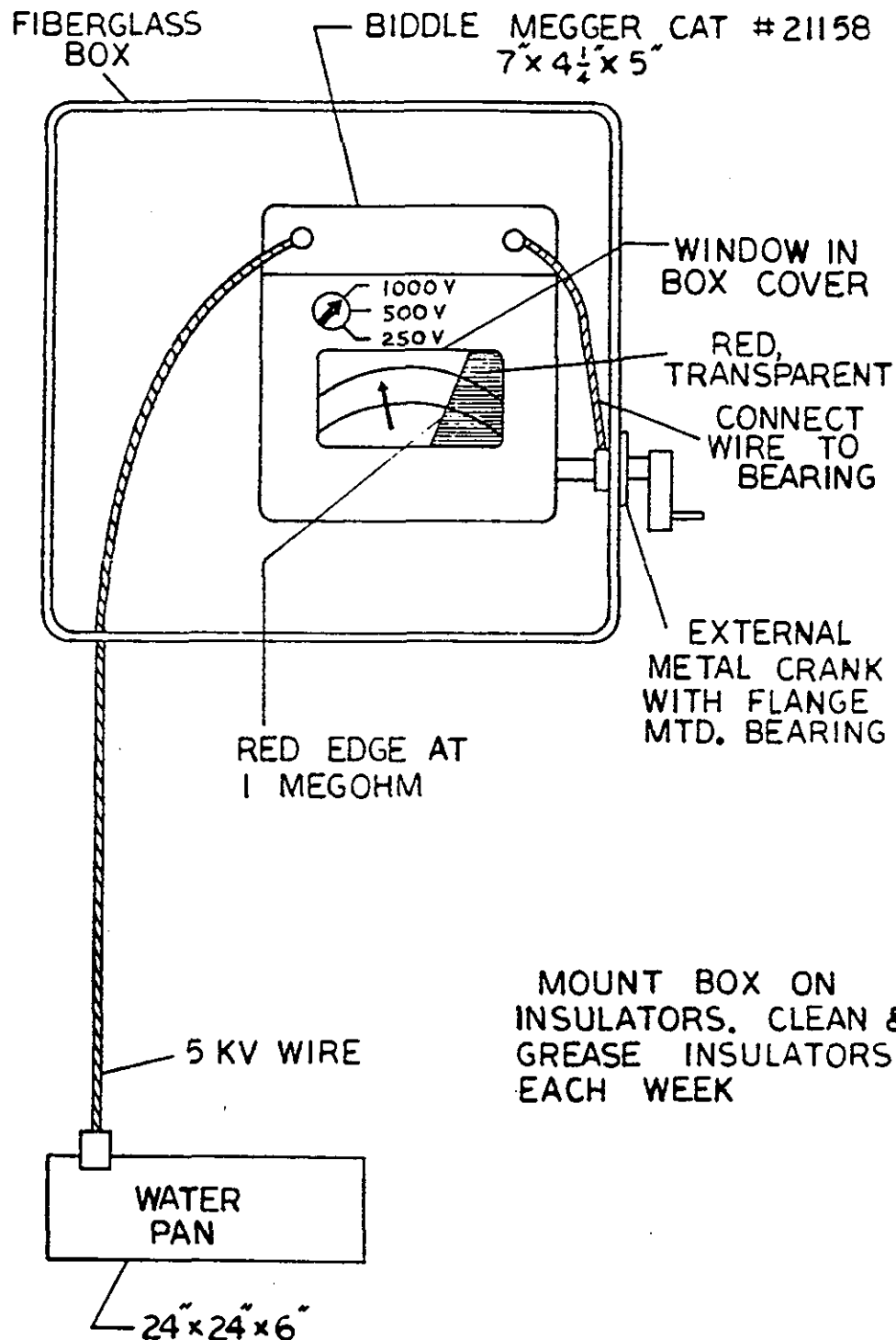
An electrical shock incident in 1967 prompted the development of some quick means of testing our rubber boots before performing work in the cell area. Many people worked on this project (Walt Gerdis, Larry Packard, George Jaeger, and others), and several modifications were made before we arrived at our present model; sketch is attached. Medical approval was obtained to assure no hazard existed.

In the Chlorine Plants, no one may enter the cell area without wearing rubber boots. The electrical boot check is required at least once every shift. Logs are kept at each tester and the results of each check must be recorded. The log is audited regularly.

Testing procedure requires that the subject submerge each boot in the water pan while cranking the megger. If resistance is such that more than approximately 1 milliamp flows, the indicator shows "in the red" and the boot should be removed.

TX Tiner
RMC0064966

HAND CRANKED BOOT TESTER



FL FINER
HMC0064968

Dow Chemical U.S.A.

PROTECTIVE CLOTHING REQUIREMENTS AND PROCEDURES

Suggested minimum Protective Clothing Requirements and Procedures have prevented numerous injuries to Dow employees performing the following jobs:

1. Operating Switchgear

When 440 or higher switchgear, especially in damp or extremely corrosive areas, is to be operated the individual operating the switchgear should:

- a. Use protective clothing such as long-guantlet gloves that offer protection against both electrical and flash burn hazards, a face shield, fire retardant jacket and rubber footwear.
WARNING: Do not wear aluminized gloves when operating electrical switchgear due to the increased electrical hazard.
- b. Even though protective clothing is worn other safe switchgear procedures should be followed, such as:
 - (1) Verify the correct identification of equipment and its switchgear before operating it.
 - (2) See that the field switch (start-stop button) is in the "off" position and that the equipment is not operating.
 - (3) Before operating switchgear, move other people in the switch room or immediate area to a safe location.
 - (4) Before moving the switchgear handle make certain the door is closed and secure and as you operate the switch that you stand as far as possible to one side, away from the path of the door, that you operate the switch handle rapidly to minimize the effects of any electrical flash.

PROTECTIVE CLOTHING REQUIREMENTS AND PROCEDURES

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2. Manually Lighting Furnaces

Minimum clothing requirements:

- a. A long-sleeved jacket or coat made of flame retardant material such as Nomex, Kynol, treated cotton, or aluminized glass.
- b. Long-guantlet gloves.
- c. A head or face shield with a chin guard.

NOTE: A written procedure should be available and followed when lighting direct-fired equipment. To summarize, protective clothing should be worn when lighting off direct-fired equipment, such as boilers, reboilers, cracking furnaces, incinerators, kilns, ovens or evaporators.

Protective clothing would not be required for lighting sanitary water heaters, space heaters, lab burners or cook stoves.

3. Catching Samples, Unplugging or Breaking Into Linesa. Catching Samples

Minimum protective clothing requirements for taking samples of hot or corrosive materials at locations other than sample points should include:

- (1) Chemical goggles (the goggle band should not be attached to the hard hat)
- (2) Hard hat
- (3) Face Shield
- (4) Rubber shoes or boots
- (5) Long-guantlet gloves
- (6) Slicker-type protective pants and jacket

NOTE: The gloves should be attached to the jacket sleeves with plastic inserts, tape, or other means to prevent harmful product from running up the jacket sleeves and causing arm burns.

PROTECTIVE CLOTHING REQUIREMENTS AND PROCEDURES

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Sample Stations: Many thermal and chemical burns resulting from sample catching can be prevented by having properly designed sample stations for all locations where samples must be caught regularly. Sample stations should have protective shields located in such a manner that the sample valves can be operated, and the samples caught without exposing personnel to sprays, splashes or drips of hot or corrosive chemical.

b. Breaking Into Lines

Minimum protective clothing requirements (for breaking into pipelines that have contained a hot or corrosive product):

- (1) Chemical goggles
- (2) Hard hat
- (3) Face Shield
- (4) Rubber shoes or boots
- (5) Long-guantlet gloves
- (6) Slicker-type protective pants and jacket
- (7) Full face gas mask equipped with proper canister, if the product involved could release harmful vapors.

NOTE: If pipelines that have contained a hot or corrosive product are to be worked on, protective clothing should be required for initial entry even though the line may have been drained or washed. This is because lines frequently plug up, resulting in hazardous chemicals becoming trapped at some point in the line.

Following proper procedures will greatly improve the effectiveness of protective clothing.