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ADMINISTRATION MANUAL

HEALTH, SAFETY ENGINEERING & PROPERTY PROTECTION

**THE FIRESTONE TIRE & RUBBER COMPANY
AKRON, OHIO**

ADMINISTRATION MANUALHEALTH, SAFETY ENGINEERING & PROPERTY PROTECTIONCURRENT PAGES AND DATE OF ISSUEVOLUME I

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Silence.

No. 12112

**MASTERS, MR
LOS ANGELES-CHICAGO-LOSAN, ON
BORDER, 12-LOCUST GROVE, CA
U.S.A.**



ADMINISTRATION MANUAL

HEALTH, SAFETY ENGINEERING & PROPERTY PROTECTION

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Part	1. THE NEED FOR EMPLOYEE AND PROPERTY PROTECTION	Date	9-11-62
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A. EMPLOYEE PROTECTION

Industrial accidents present a problem that merits serious consideration and attention. Approximately 15,000 people are killed by work accidents in the United States each year. There are annually close to 2,000,000 disabling injuries from occupational activity, of which nearly 10,000 involve some permanent impairment.

In addition to pain and possible crippling effects, an injured worker and his family often suffer a serious financial loss despite workmen's compensation payments. Of course, no payment is an adequate compensation for a death or a permanent impairment.

As an aid to help insure and improve the excellence of the Firestone Safety Program, this manual has been prepared. The information and contents of the manual present the work of the many Firestone Departments which work actively toward the protection of Firestone employees.

B. PROPERTY PROTECTION

The value of Firestone plant, equipment and property runs into many millions of dollars. The protection of this property from hazards of fire, catastrophes, and damage are a prime necessity and is closely linked with the problems of employee protection. Experience dictates the necessity of coordinating the problems of employee and property protection.



ADMINISTRATION MANUAL

HEALTH, SAFETY ENGINEERING & PROPERTY PROTECTION

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A. JOINT HOME OFFICE DEPARTMENTAL COOPERATION

The Administration Manual - Health, Safety Engineering, and Property Protection is the product of the coordinated efforts of the Safety, Medical, Insurance, Technical, and Engineering Departments. These departments prepared the various sections of the manual under their control and is the result of many years of Firestone experience and activities in these areas.

In making future additions and deletions each department is charged with the responsibility for keeping its sections pertinent and up-to-date in keeping with the policies and instructions of management. All individual plants are urged to present their ideas, suggestions, corrections and improvements in the manual to the Home Office Departments concerned.

B. CUSTOM-MADE MANUAL

Because of the wide variety of products and type of plants operated in Firestone's organization, it is necessary that the manual be "custom-made" to fit plant groupings. These groupings are presented as follows:

1. Tire Plants
 - a. Domestic
 - b. Foreign
 - c. Licensee
2. Textile Plants
3. Industrial Products Plants
4. Steel Products Plants
5. Foam Rubber and Polyurethane Plants
6. Plastic Products and Plastic Resins Plants
7. Defense Products Plants
8. Rubber Reclaiming Plants
9. Synthetic Rubber Plants
10. Research

The master copy of the manual will be kept by the Home Office Interplant Department. It will contain the complete edition of the Administration Manual. The manuals sent to each plant will contain only the information which applies to the particular plant.

1



ADMINISTRATION MANUAL

HEALTH, SAFETY ENGINEERING & PROPERTY PROTECTION

Section II RESPONSIBILITY FOR SAFE PLANT OPERATION

VOLUME I
Page 2.1. A.1

Part 1 COMMUNICATION SYSTEM

Date 11-4-63
Cancels None

A. DEPARTMENTS ISSUING INSTRUCTIONS AND PROCEDURES

Within the Firestone organization many departments are charged with responsibilities concerning problems of Health, Safety, Engineering and Property Protection and with the issuance of instructions, standard practices and procedures. The departments most directly involved within the Home Office include the Safety, Insurance, Production, Technical, Medical, and Engineering departments.

The purpose of this manual is to coordinate, consolidate, and collect into one manual for company and plant use the cooperative efforts of these departments in dealing with the problems in this management area. Each department is responsible for the subject matter presented in its section of the Manual.

New additions to the manual should be approved by the following managers for those sections under their control.

Technical	Director of Research
Insurance	Insurance Manager
Safety	Safety Director
Medical	Medical Director
Engineering	Chief Engineer
Plant Protection	Plant Protection Manager

B. OPERATION OF THE SYSTEM

As is the current practice all important matters dealing with Health, Safety, Safety Engineering, and Property Protection should be released to the plants using the Interplant Release Method - Code #10. A Communication System Chart is presented on the following page to outline the release method.

Within the Home Office the various departments work and cooperate on problems of employee and property protection; after a problem has been investigated and discussed with top management, a formal release is made. The release method insures that the contents of the release are directed to the attention of the proper plants and Plant Personnel.



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VOLUME I
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Part I COMMUNICATION SYSTEM

Date 12/29/69
Cancels None

INTERPLANT RELEASE

RESPONSIBILITY FOR ADMINISTRATION MANUAL

ISSUED TO:

PLANT MANAGERS
SAFETY ENGINEERS
ALL PLANTS - DOMESTIC & OVERSEAS

NO. IP.10-38

PAGE 1 of 1

ISSUED 12/29/69

EFFECTIVE 12/29/69

ISSUED BY M. R. BATCHE
G. H. WEATHERBE

APPROVED BY J. T. CAHOON

SUBJECT:

ADMINISTRATION MANUAL
HEALTH, SAFETY ENGINEERING & PROPERTY PROTECTION

Until this release, information and additions for the Administration Manual, Health, Safety Engineering & Property Protection, Volumes I and II, have been released to the plants through Interplant Department, Akron, by means of the Interplant Release system as noted in Section II, Responsibility for Safe Plant Operation, Communication System, Volume I, Pages 2.1.C.1 thru 2.1.C.3.

Effective with this release, Home Office Corporate Safety is assuming responsibility for the Administration Manual, Volumes I and II, including Master Copy, content, additions and revisions and the distribution of all releases of essential information.

Until further advised, all communications relating to the Administration Manual should be directed to Corporate Safety, Personnel Relations Dept., Akron

Although there are no extra copies of the Administration Manual presently available, Corporate Safety is updating and revising the manual to reflect latest in topics of industrial hygiene, safety and fire prevention. Additional copies can be made available upon completion of the planned revisions.

RECEIVED
JAN 8 1969
G. L. WILSON
INDUSTRIAL HYGIENIST

S-4272-M

The Firestone Tire & Rubber Company

SUBJECT TO DISCLOSURE RESTRICTION

40654



ADMINISTRATION MANUAL

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C. CONTENT AND FORM OF THE RELEASE

1. Additions To The Manual

This manual has been written incorporating the code #10 releases issued up to the manual was released. To help insure that the manuals are kept up to date and are accurate all releases will be distributed in the brown Firestone Mail envelope (Form S-3060M) When new pages are received the new material should be correctly inserted into the manual, the cancelled pages placed inside the mailing envelope and returned to the Akron Interplant Department. This department will use the returned material for a feedback check to assure that manuals are kept up to date.

For the manual to provide maximum service and usage the manual must be accurate and up to date. It will be the policy to continually remove and/or replace pages which become obsolete.

2. Form S-4273-M

All releases should be typed on yellow mats, Form S-4273-M using an electric typewriter. After typing the Ediphone Department will multilith the required number of copies. These should then be given to the Interplant Department for distribution.

3. Distribution of Materials Releases

Distribution will be made to those persons as indicated on the distribution list on pages viii, ix, and x. The release should be "custom made" and issued only to the plants for which it applies.

4. Master Copy

The Interplant Department copy will be the Master Copy against which titles, page numbers, and dates, etc., should be checked.

5. Use of Names

It is recommended that person's names not be used throughout the manual except in the distribution listing and in the issuing and approval of release.



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C. CONTENT AND FORM OF THE RELEASE (CONTINUED)

This recommendation is made because of the change, retirement, and relocation of personnel and the need to keep names and locations up to date. Instead of personal names it is recommended that job titles be used such as Plant Manager, Plant Engineer, Chief Chemist, etc.

6. Title Page

This page should be separate from the text pages which are to be inserted into various sections of the manual. It should have the following necessary information in addition to comments, upon the release. The title page is usually presented on plain paper as shown in the example which follows.

7. Drawings

Large drawings and bulk printed matter issued with the release which are not included in the manual should be accurately described for references purposes.



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INTERPLANT RELEASE

Issue To: (Example)

All Tire Plant Managers
Domestic and Foreign as
per approved list
(Example)
Synthetic Rubber Plants
as per approved list

No: (Interplant Release Number)

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(Manual page numbers)

COMMENTS:

(Comments concerning the release)



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A. RESPONSIBILITIES OF HOME OFFICE DEPARTMENTS

The chief executive has the responsibility for the performance of company policy determined by the Board of Directors and he, in turn, delegates areas of responsibility to the various functional executives. The functional groups cooperate with each other to prepare and assemble instructions, procedures, and standard practices which are presented to the Plant Managers and plant level managers for performance and execution.

1. PRODUCTION MANAGEMENT FUNCTION

The Home Office production management function is to direct the operation and production of the plants in producing Firestone products. It is the responsibility of this function to develop, coordinate, originate, direct and administer programs covering the protection of employees and property.

2. SAFETY MANAGEMENT FUNCTION

The following is a resume of the responsibilities of the Home Office Safety Department.

- a. The Manager of the Safety Department reports to the Director of Industrial Relations and is responsible for coordinating and managing the Safety Program in all company plants. He originates, develops, and coordinates the accident prevention activities of domestic and foreign Firestone plants. The manager of Safety acts in an advisory capacity to the Plant Safety Engineers.
- b. The Safety Manager formulates safety procedures and refinements on Safety Policy for use in all Firestone plants to prevent and reduce the frequency and severity of accidents.
- c. The Safety Manager develops and maintains an expert knowledge of the principles of Industrial Safety. He maintains expert knowledge of safety procedures and instructions and supervises the preparation and distribution of all necessary safety and accident reports and the supplying of safety information to all plants. He further serves in an advisory capacity to management and subsidiary plants with respect to safety work.



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- d. The Safety Manager has the responsibility to keep up to date in development and research in the field of safety.
- e. The Safety Manager has the responsibility to keep up to date on the Safety operating conditions in all plants. He inspects Akron and subsidiary plants, analyzing operating conditions from a Safety viewpoint and confers with the plant management upon his findings.
- f. The Safety Manager is responsible for the control and functioning of the Union-Management Safety Committee. The work of this committee pertains to safe work practices, sanitary and healthful working conditions.

3. ENGINEERING MANAGEMENT FUNCTION

The engineering management function is responsible for directing the engineering department activities as they relate to the problems of protecting employees and property. Included in these responsibilities are the following:

- a. The engineering, design, and installation of new and existing plants, processes, equipment, and machinery based upon recognized safe engineering practices.
- b. Cooperation with Home Office departments in the development and maintenance of an effective Safety Inspection Program. To further check upon the effectiveness and operation of the program by means of feed back inspection reports and on the site inspection.
- c. To initiate corrective action to correct unsafe conditions as they are discovered or made known.
- d. To assist and cooperate with the Production, Safety, Medical, Technical, and Insurance departments with their responsibilities.

4. INSURANCE MANAGEMENT FUNCTION

The following is a resume of the insurance management responsibilities as they relate to the protection of employees and property:



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- a. Purchase and maintain adequate insurance coverage in accord with company policy at the lowest possible cost.
- b. Process and negotiate all claims resulting from insurable risks. Maintain loss statistics by individual property.
- c. Review and evaluate inspection reports made by both our plants and insurance companies. Review and evaluate plans and processes for fire protection and pressure vessel safeguards for new properties and additions to present properties.
- d. Responsibility for preparation of standards and procedures relating to fire protection, safeguarding boilers and pressure vessels, and other hazards covered by property insurance.
- e. Make recommendations to Management of suggested improvements in company policy, procedure, and techniques appertaining to Insurance and Fire Protection.
- f. Knowledge of operating conditions in all properties and up to date developments in the field of fire protection engineering, throughout the world.
- g. At Management request, visit our properties to review property protection program, assist in loss adjustment and procurement of insurance coverage.
- h. Coordinate with Engineering and Purchasing Departments in the procurement of approved equipment and devices, so as to secure maximum protection at minimum cost.
- i. Coordinate with Laboratory, Safety, Engineering, Medical, and Purchasing Departments when new hazardous chemicals or materials are to be used, by assisting in preparing a safe procedure.



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5. MEDICAL MANAGEMENT FUNCTION

The responsibility of the Medical Department can be divided into four main categories.

I. Care of the Injured

It is the responsibility of this department to direct the care of all injured persons. This is to be accomplished either by direct care within the plant dispensary or by the use of expertly trained consultants. The selection of these consultants and their use on any particular case is the sole responsibility of the Medical Department.

II. Employee Health Protection and Maintenance

It is the responsibility of the Medical Department to maintain a program of preventive medicine for the protection of the Company and the employee. This program should provide for:

1. Preemployment placement examinations.
2. Physical rechecks on rehire and following sick leaves.
3. Work capacity evaluation to guide the Employment Office in placement of individuals who have developed physical limitations.
4. Evaluation of partial and total disability applicants.

III. Industrial Hygiene Department

In order to safeguard the work environment of the employee, the Medical Department must maintain an adequate Industrial Hygiene Department. The detailed responsibilities of this department are described in another section of this manual.

IV. Miscellaneous

It is the further duty of the Medical Department to advise management in all medical matters in Akron as well as in the subsidiaries.



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6. TECHNICAL MANAGEMENT FUNCTION

The technical management function is responsible to advise, aid, cooperate, and instruct the other functional areas in the safe handling, storage, use, and processing of all chemicals and related materials used in Firestone Plants. The department is also responsible for the issuance of Standard Practice Specification and advising of the fire explosive, health hazards and technical information concerning the materials and chemicals used. It is the responsibility of the management to report to the Medical Department the names and information available on all chemicals, pigments and materials with known health hazards.

7. PURCHASING MANAGEMENT FUNCTION

a) Purchase of Chemicals

When new chemicals and materials are purchased for use in the plants the purchasing department is responsible to aid the other management functions in learning the health and safety hazards involved in the use of these materials. This may often be accomplished by requesting the vendor to supply complete handling instructions and technical data concerning their product and delivering this information to the appropriate persons to receive it. In most cases the vendor is the best source of this information and has it readily available.

b) Purchase of Approved Equipment

It is the responsibility of the purchasing department to purchase only safety equipment items "approved" by an accredited national safety organization as meeting the necessary safety requirements.

8. CONTROLLING MANAGEMENT FUNCTION

The controlling management department has the responsibility to process insurance claims accurately and quickly working with the Insurance Department.



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9. INTERPLANT MANAGEMENT FUNCTION

a. Issuance of Interplant Releases

It is the responsibility of the Interplant Department to make the formal issuance of Interplant Releases concerned with Health, Safety Engineering and Property Protection. The Interplant Department has the responsibility to determine that the release form is correct and that the releases are typed using an IBM "Executive" typewriter on form S-4273-M. The release should clearly indicate the name of the person or persons and the plants to which it is sent. The department is responsible to keep the approved distribution list up to date and correct.

b. Record System for Releases

It is the responsibility of the Interplant Department to keep the Master Copy of the Manual in the permanent interplant file under Code #10, Health, Safety Engineering and Property Protection (formerly Safety). It is further the responsibility of the department to maintain an up to date listing of Code #10 releases by Title, person issuing, date issued and to whom sent and to revise this list in the Manual as necessary.



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B. PLANT LEVEL RESPONSIBILITIES

Plant level functional managers are charged with the responsibility of execution and performance of the Health, Safety Engineering and Property Protection Programs developed, directed, and administered by the Home Office. To clarify these responsibilities each plant level function is considered separately.

1. PLANT MANAGEMENT FUNCTION

The Plant Manager is the manager of the Plant Management Function. He has the prime responsibility for the safe operation of the plant. The word "plant" in this instance includes the physical plant, the employees, and outside personnel working in it; also the management mechanics involved. In filling these responsibilities the following are some of the things he will want to do.

- a. Present the Firestone Safety Program to the functional managers.
- b. Make periodic inspections of the plant to determine if the policies, instructions, Inspection program, test program, and the issuance of reports are effectively and promptly being carried out.
- c. Make recommendations to Management of suggested improvements in company policy, procedure, and techniques.
- d. Become familiar with the contents of the Administration Manual and the Factory Safety Manual.
- e. As part of the continuing Inspection Program in each plant is located a file containing the Firestone Inspection and Preventive Maintenance System. The record system is used to schedule, instruct, and record test and inspection procedures which are mandatory in Firestone Plants. Included in the scheduling is an Annual Plant Inspection Report to be submitted by the Plant Manager to the Vice-President. This very brief report is automatically scheduled for attention once each year.

2. PRODUCTION FUNCTION

The manager of the production function is the Production Manager. Among this manager's responsibilities are included the following:



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- a. The responsibility to determine that the Safety Programs are integrated and coordinated with the Production Programs. This executive who is responsible for low production cost and high efficiency, is also responsible for carrying out the accident prevention program.
- b. The determination that Safety Instructions are included among the written operating instructions including check lists, charts, and drawings where required. Specific safety instructions should be included to assure protection of personnel and equipment from designated hazards.
- c. A knowledge of the contents of the Factory Safety Manual and this Administration Manual.
- d. Responsibility for the training of employees in safe working habits.
- e. Responsibility to determine that Safety & Health Hazards, as they become recognized, are corrected. This responsibility includes the correction of mechanical hazards, fire hazards, chemical hazards, and health hazards.

3. SAFETY FUNCTION

The Manager of the Safety Function is the Safety Engineer; included in his responsibilities are the following:

- a. He is employed in a staff capacity and his authority is to advise the managers and supervision on problems encountered in providing safer working conditions, processes, and practices.
- b. The Safety Engineer has authority to issue orders to supervisors when a definite hazard exists that endangers the Safety of employees.
- c. The Safety Engineer is responsible for the quality and reliability of the service, advice, and assistance that he gives to line management.



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- d. The Safety Engineer's role in liason with the Plant Engineer and Staff Engineers performs the following services:
- 1) Advise the engineer of personnel and safety requirements.
 - 2) Assist the engineer in complying with applicable safety codes and local, state, and national law requirements.
 - 3) Be thoroughly informed concerning current design and installation work and approve it from the Safety viewpoint so that all Safety questions and requirements may be comprehensibly and quickly answered and any deficiencies found corrected. The Safety Engineer has the responsibility in installation Programs and processes to ascertain prior to the installation phase that the program will meet the necessary safety requirements.
 - 4) Assist the engineers in obtaining operating organization approvals involving Safety design early in the project.
 - 5) Assist the engineer by making analysis to determine economic justification of changes or inclusions in design of construction recommended for Safety Reasons.
- e. Responsibility for knowledge of the full contents of the Factory Safety Manual. Use this knowledge to assist the functional managers in carrying out their responsibilities.
- f. The Safety Engineer's responsibility is to keep the Plant Manager informed on the effectiveness and operation of the Safety program.
- g. The Safety Engineer has the responsibility to assist in the writing of Safe Practice Procedures for the plant.
- h. The Safety Engineer has the responsibility to accurately report to the Plant Manager the status of mandatory Safety Inspections required by the Administration Manual.
- i. Responsibility for the inspection of such safety equipment as is not covered by the inspection program. This would include such items as safety tools, safety masks, etc.



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4. ENGINEERING FUNCTION

The manager of the engineering function is the Plant Engineer, a resume of his responsibilities is as follows:

- a. Responsibility for engineering specifications, designs, construction, maintenance, and utilities. The engineering work in these areas should conform to Firestone Engineering Standards and recognized safety standards.
- b. Responsibility for the maintenance and operation of a reliable safety inspection record system. Responsibility for those items in the inspection program as are assigned to the maintenance department. All items to be inspected and tested are included in detail in this manual, their responsibility assigned. They include such regular inspection items as boilers, pressure vessels, electrical equipment, relief valves, and others.
- c. Responsibility for the knowledge of the contents of this Manual which apply to the engineering function. The knowledge is important in the instruction of foremen and craftsmen.

5. CONTROLLING FUNCTION

The manager of the controlling function is the Controller. In the area of Health Safety Engineering and Property Protection, the responsibility of this manager is to accurately and promptly prepare loss and insurance claim reports as prescribed by standard practice procedure. The information going into these reports is generally supplied by the Cost Accounting and Engineering departments.

6. TECHNICAL FUNCTION

The manager of the technical function is the technical manager. In the operation of the laboratory this manager is responsible for the following:



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- a. The safe handling of chemicals and hazardous materials.
- b. The responsibility to communicate his knowledge of the hazardous materials to the plant and members of the laboratory.
- c. The responsibility to make regular chemical safety checks and analysis as may be required.
- d. The responsibility to prepare Standard Practice Specifications for plant operations.

7. MEDICAL FUNCTION

The medical function on the plant level is the responsibility of the Plant Doctor; in subsidiary plants he is usually employed on a part time basis dependent upon the medical services required in each particular plant. His responsibilities include those outlined in the section under Home Office Medical Department. Counsel and information on Medical problems should be obtained from the Firestone Medical Director in the Home Office.

8. PURCHASING FUNCTION

The manager of the purchasing function is the Purchasing Agent. This manager is responsible to ascertain that only nationally approved safety equipment is purchased for plant use. When purchasing chemicals and materials known to be hazardous, the agent should secure safety and medical instructions, literature and recommendations from the vendor. The vendor is usually an excellent reference on these problems and has the information readily available.

9. PLANT PROTECTION FUNCTION

The Industrial Relation's Manager is responsible for the management of the Plant Protection and Fire Fighting, groups; These include the plant guards and firemen. Counsel and information on this function should be obtained through the Home Office Industrial Relations Department.

1 - Inspection
unpublished



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A. DETERMINATION OF INSPECTIONS REQUIRED

Because many equipment items are required to be inspected periodically by the insurance carriers and the laws of local, state, and federal government, it is necessary to establish, in detail, a Standardized Program of Regular Inspections. The items specified for inspection by the program are the result of a coordinated determination made by the Safety, Insurance, and Engineering departments. The determination was made following a Survey of Safety Inspections made in Firestone Domestic Tire Plants. The following charts list the items to be inspected, the department accounts to be charged with labor and materials, the departmental responsibility for making the inspection, the frequency with which the inspections are to be made and the form number of the Inspection Report.

B. ADDITIONS TO THE REQUIRED INSPECTIONS

Plants which require additional safety or fire inspections not shown on the list should notify the Home Office Safety, Insurance or Engineering Departments immediately. Inspections should not be added or deleted from the program without Home Office Approval.

C. FREQUENCY OF INSPECTIONS

The frequency with which the inspections are to be made is based upon current practice in the plants or as required by legal requirements. Frequency will be revised as the records indicate whether the frequency period should be lengthened or shortened. It is the desire of management to make inspections as infrequently as possible consistent with legal requirements and sound safety and engineering practice.

D. PROGRAM IMPROVEMENTS

All plants are requested to submit suggestions for improvements in form design, instructions, procedure, and test methods to the Home Office in order that worthwhile suggestions may be adopted into the Inspection Program.



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A. THE FIRESTONE RECORD SYSTEM

1. INTRODUCTION

A working safety inspection program is a vital necessity in the overall Safety Program in the Firestone Organization. The Safety Inspection program insures that the plant operating facilities and equipment are under a systematic, regular inspection program at all times. This reliability provided by safety inspections reduces the possibility and probability that accidents will occur and, therefore, provides a plant in which it is safer for employees to work.

To provide this thoroughly reliable inspection system, the methods of scheduling and record keeping are combined with the Firestone Preventive Maintenance program. All safety inspection records are coded in the Safety green color to keep them separate and distinct from preventive maintenance items. Using this color coding system it is possible at all times to follow the items and records under Safety Inspection Control.

2. SCHEDULING AND REPORTING

The Firestone Safety Inspection System and the Firestone Preventive Maintenance System are "custom made" around the Le Febvre-Speedex system. The three preventive maintenance forms and the Safety Inspection Report Forms are housed in a permanent, easily accessible, file for quick visual inspection and ready reference. The system is simple and may be installed with a minimum of explanation and a minimum of supervisory time. No slow or cumbersome paper work. The System is designed to provide automatic scheduling of All Safety Inspections and Preventive Maintenance items with a maintenance history record and complete nameplate data for each major piece of equipment. These forms were designed to provide for the proper data and to facilitate and simplify the recording of maintenance work and safety test and inspection reports.

3. HOW THE SYSTEM WORKS

For each Safety Inspection Item or piece of equipment to be given a safety inspection or safety report to be prepared there is a Safety Inspection Work Order form which provides scheduling for that item. This card is used for all scheduling regardless of nature of frequency, other than daily or weekly check list routines.



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A. THE FIRESTONE RECORD SYSTEM

3. HOW THE SYSTEM WORKS (CONTINUED)

All safety inspection items are filed under a main file divider entitled SAFETY INSPECTION PROGRAM. Behind this divider in the file is located the Speedex inner guide. The inner guide contains the alphabetical listing of the mandatory safety inspections. This inner guide is used to easily locate the desired inspection record. Complete information concerning the operation of the record system may be found in the Plant Engineer's Manual under Section II, part 5, beginning with page 2. 5. 1.

4. THE BASIC FORM

The system provides for one card for each Safety Inspection or report to be made. A basic form is used for all items, across the top of this form is located the months and weeks of the year. A visible, moveable signal is attached to the form to mark the date of the inspection. Along the right hand side of the form is located an area in which the plan for inspection is recorded by frequency code (number of times a year the inspection is to be performed by a person or craft). In the body of the form is printed the Instructions and Procedures to be followed in making the inspection. Also included in the body is the record and report data to be completed during the inspection. In the lower right hand corner is a distribution list specifying to whom a copy of the inspection report form is to be forwarded. It is important that the distribution be made promptly as specified because the distribution is part of a feed back system of checking the regularity and quality of the inspections being made. Note that no provision is made for scheduling recurrent daily or weekly inspections, these highly repetitive operations are scheduled by the System but are checked on only a monthly, quarterly or annual basis. Each inspection item specifies the frequency with which the inspections are to be made.

5. HANDLING SAFETY INSPECTION WORK ORDERS

Each week, all cards are scanned, and the Safety Inspection Work Orders having a signal for current week are pulled. This scanning and withdrawal require only a minute even in quite large systems. The pulled Safety Inspection Work Orders are then used to reproduce work orders needed as per schedule, i. e., one for each craft or person scheduled to perform the inspection. The reproduction can be accomplished on a



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A. THE FIRESTONE RECORD SYSTEM

5. HANDLING SAFETY INSPECTION WORK ORDERS (CONTINUED)

Bruning or similar type diazo process. Distinctive color paper is used in making reproductions --- blue, mechanics; yellow, miscellaneous; green, safety; pink, electrical; and orange for lubrication. This provides automatic routing by color. (An alternate method uses the color to indicate the day of the week rather than the craft.)

As the Safety Inspection Work Orders are completed, copies are made of the completed report and distributed to the persons specified in the distribution list. At this time a new work order is refiled, the signal in the visible margin is moved to the next week in the year that the inspection is scheduled.

6. RESPONSIBILITY ASSIGNMENT

It has been found helpful in establishing the Safety Inspection Program to assign the responsibility for conducting and following the inspections to a definite person. The Safety Inspection Program - Responsibility Assignment form is provided for this purpose. The Safety items to be inspected or reported upon are listed across the top of the report, the names of persons assigned to follow the inspection are listed along the left hand side, it is not unusual to have several persons following an important inspection, however, the number should be controlled. A copy of the inspection report should be distributed to those persons assigned to it, usually one copy is sufficient in cases of joint responsibility.



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A. DOMESTIC TIRE PLANTS AND CANADA

Item	Charge L&M	Respon- sibility	Frequency	Form Number S-4356
A.C. Motor and Control	S&M	M	Annually	1
BOM & NAF Curing Presses	S&M	M	Quarterly	2
Cables)	S&M	M	Monthly	2
Safety trips)	S&M	M	Quarterly	2
Pins)	S&M	M	Quarterly	2
Pressure Switch) 1 Form	S	M	Quarterly	2
BOM train)	S	M	Bi-Weekly	2
Safety Stops)	S	M	Quarterly	2
Chain Blocks & chain links (Inspect when used)	S	M	Quarterly	3
Conveyor Belts	S	M	Monthly	4
Colson Jacks (Inspect when used)	S	P&M	Quarterly	5
Calender & Mill, (Inspect when used)	S	P&M	Monthly	6
D.C. Motors and Control	S&M	M	Annually	7
Doors (powered overhead)	S&M	M	Quarterly	8
Elevators (Annual State)	S&M	M	Monthly-Annually	9
Electric Cables & Manholes	S&M	M	Annually	10
Fire Protection & Equipment Inspection	S	F.D.	Monthly	11
Flap Mold Press Inspection	S&M	M	Quarterly	12
Grinding Equipment (All Kinds)	S&M	D&M	Quarterly	13
Hoists (All Kinds)	S&M	M	Quarterly	14
Hand Powered Tools (Electric ground)	S&M		Semi-Annually	15
Instruments Employing Radio Active Source	S	M	Semi-Annually	16
Ladders (Safety shoes-Aluminum)	S&M	M	Annually	17



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A. DOMESTIC TIRE PLANTS AND CANADA (CONTINUED)

<u>Item</u>	<u>Charge L&M</u>	<u>Respon- sibility</u>	<u>Frequency</u>	<u>Form Number</u> S- 4356
Machine Feed Screws & Conveyor Safeties (Inspect when used)	S	P&M	Quarterly	18
Mold Breaker Inspection	S	M	Quarterly	19
Mold Hold Down Bolts	S&M	M	Quarterly	20
Pressure Vessels (Unfired-internal)	S	M	Bi-Annually	21
Pressure Vessels (Unfired-external)	S	M	Annually	21
Pressure Vessels (Fired-internal & external)	S	M	Annually	21
Propane Bulk Storage (weekly)	S	F. D.	Quarterly	22
Report on Accidents & Happenings	S	S	Occasion	23
Safety Manager's Inspection	S	S	Annually	24
Safety Shower & Eye Wash Fountains (Weekly)	S	S. E.	Semi-Annually	25
Safety Relief Valves	S	M	Annually	26
Sewer Manholes Explosion Test (Weekly)	S	F. D&S. E.	Quarterly	27
Safe Handling of Hazardous Materials	S	C. C. &S. E.	Semi-Annually	28
Trucks & Tractor Inspection (Inspect when used)	S&M	D&M	Bi-Monthly	29
Tube curing Presses	S&M	M	Quarterly	30
Transformer Inspection Report	S&M	M	Annually	31
Vulcanizers Safety Inspection	S&M	M	Semi-Annually	32
Ventilation (Post Cement Units)	S&M	M	Monthly	33
Welding Equipment (Gas-Inspect when used)	S&M	M	Semi-Annually	34
Window Washer Lag Screws (Multi-story Plants)	S&M	M	Annually	35

CODE:

L&M - Labor & Materials
S - Safety
M - Maintenance

F. D. - Fire Department
P - Production
D - Departmental

S. E. - Safety Engineer
C. C. - Chief Chemist

5-4279-M

The Firestone Tire & Rubber Company

SUBJECT TO DISCLOSURE RESTRICTION

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B. FOREIGN TIRE PLANTS

<u>Item</u>	<u>Charge L&M</u>	<u>Responsi- bility</u>	<u>Frequency</u>	<u>Form Number</u> S- 4356
A. C. Motor and Control	S&M	M	Annually	1
BOM & NAF Curing Presses	S&M	M	Quarterly	2
Cables)	S&M	M	Monthly	2
Safety Trips)	S&M	M	Quarterly	2
Pins) 1 Form	S&M	M	Quarterly	2
Pressure Switch)	S	M	Quarterly	2
BOM train)	S	M	Bi-Weekly	2
Safety Stops)	S	M	Quarterly	2
Chain Blocks & Chain Links (Inspect when used)	S	M	Quarterly	3
Conveyor Belts	S	M	Monthly	4
Colson Jacks (Inspect when used)	S	P&M	Quarterly	5
Calender & Mill (Inspect when used)	S	P&M	Monthly	6
D. C. Motors and Controls	S&M	M	Annually	7
Doors (powered overhead)	S&M	M	Quarterly	8
Elevators (Annual State)	S&M	M	Monthly-Annually	9
Electric Cables & Manholes	S&M	M	Annually	10
Fire Protection & Equipment Inspection	S	F. D.	Monthly	11
Flap Mold Press Inspection	S&M	M	Semi-Annually	12
Firestone Jacket Molds	S&M	M	Quarterly	36
Grinding Equipment (All Kinds)	S&M	D. M.	Quarterly	13
Hoists (All Kinds)	S&M	M	Quarterly	14
Hand Powered Tools (Electric ground)	S&M		Semi-Annually	15
Instruments Employing Radioactive Source	S	M	Semi-Annually	16
Ladders (Safety shoes-Aluminum)	S&M	M	Annually	17



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			Cancel None

B. FOREIGN TIRE PLANTS (CONTINUED)

<u>Item</u>	<u>Charge L&M</u>	<u>Responsi- bility</u>	<u>Frequency</u>	<u>Form Number</u> S- 4356
Machine Feed Screws & Conveyor safeties (Inspect when used)	S	P&M	Quarterly	18
Mold Breaker Inspection	S	M	Quarterly	19
Mold Hold Down Bolts	S&M	M	Quarterly	20
Pressure Vessels (Unfired-internal)	S	M	Bi-Annually	21
Pressure Vessels (Unfired-external)	S	M	Annually	21
Pressure Vessels (Fired-internal- external)	S	M	Annually	21
Propane Bulk Storage (Weekly)	S	F. D.	Quarterly	22
Report on Accidents & Happenings	S	S	Occasion	23
Safety Manager's Inspection	S	S	Annually	24
Safety Showers and Eye Wash Fountains	S	S. E.	Semi-Annually	25
Safety Relief Valves	S	M	Annually	26
Sewer Manhole Explosion Test (Weekly)	S	F. D. & S. E.	Quarterly	27
Safe Handling of Hazardous Materials	S	C. C. & S. E.	Semi-Annually	28
Shear-Strip presses	S&M	M	Quarterly	37
Truck & Tractor Inspection (Inspect when used)	S&M	D&M	Bi-Monthly	29
Tube Curing Presses Inspection Report	S&M	M	Quarterly	30
Transformer Inspection Report	S&M	M	Annually	31
Vulcanizers Safety Inspection	S&M	M	Semi-Annually	32
Welding Equipment (Gas-inspect when used)	S&M	M	Semi-Annually	34

CODE:

L&M - Labor & Materials	F. D. - Fire Department	S. E. - Safety Engineer
S - Safety	P - Production	C. C. - Chief Chemist
M - Maintenance	D - Departmental	



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Date 11-14-62

Cancel None

C. LICENSEE TIRE PLANTS

<u>Item</u>	<u>Charge L&M</u>	<u>Responsi- bility</u>	<u>Frequency</u>	<u>Form Number</u> S- 4356
Alternating Current Motor & Control	S&M	M	Annual	1
BOM & NAF Presses	S&M	M	Quarterly	2
Cables)	S&M	M	Monthly	2
Safety Trips)	S&M	M	Quarterly	2
Pins)	S&M	M	Quarterly	2
Pressure Switch)	S	M	Quarterly	2
BOM Train)	S	M	Bi-Weekly	2
Safety Stops)	S	M	Quarterly	2
Chain Blocks & Link Chain	S	M	Monthly	3
Calenders & Mills (Inspect when used)	S	P&M	Monthly	6
D. C. Motors & Controls	S&M	M	Annually	7
Elevators (Monthly)	S&M	M	Annually	9
Electric Cable & Manholes	S&M	M	Annually	10
Fire Protection Equipment Inspection	S	F. D.	Monthly	11
Grinding Equipment (All Kinds)	S&M	D&M	Quarterly	13
Hoists (All Kinds)	S&M	M	Quarterly	14
Ladders (Safety Shoes-Aluminum)	S&M	M	Annually	17
Mold Hold Down Bolts	S&M	M	Quarterly	20
Pressure Vessels (Unfired internal)	S	M	Bi-Annual	21
Pressure Vessels (Unfired external)	S	M	Annually	21
Pressure Vessels (Fired, internal & external)	S	M	Annually	21



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C. LICENSEE TIRE PLANTS (CONTINUED)

<u>Item</u>	<u>Charge L&M</u>	<u>Responsi- bility</u>	<u>Frequency</u>	<u>Form Number</u>
				S- 4356
Safety Relief Valves	S	M	Annually	26
Tube Curing Presses Inspection	S&M	M	Quarterly	30
Transformers Inspection Report	S&M	M	Annually	31
Vulcanizers Safety Inspection	S&M	M	Semi-Annual	32

CODE:

L&M - Labor & Materials
S - Safety
M - Maintenance
F.D. - Fire Department
P - Production
D - Departmental
S. E. - Safety Engineer
C. C. - Chief Chemist

Interp^{light}
Releases



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		Cancel	None

A. SUMMARY OF RELEASES

The following is a complete list of the Safety Interplant Releases issued to date by the various departments concerned with issuing Safety releases. All formalized Health, Safety Engineering, and Property Protection instructions and information will be issued using the Interplant Release method. When new information and instructions are received, they should be immediately placed in their proper location in the manual.



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Date 11-5-63
Cancels None

A. SUMMARY OF RELEASES (CONTINUED)

<u>Number</u>	<u>Title</u>	<u>Date Issued</u>	<u>Manual Location</u>
IP-10-0	Welding and Cutting Operations	4-9-58	7.2. C.1
IP-10-1	Pierce Tire Wrapping Machine	2-6-58	10.2. A.1
IP-10-2	Storage of Materials in Outside Warehouses	3-18-58	
IP-10-3	Powder Actuated Hand Tool-Rem Stud Driver	6-2-58	10.2. C.1
IP-10-4	Fire Prevention, Factory Trucks and Tractors	7-24-58	7.2. A.8
IP-10-5	Fire Prevention, Factory Trucks and Tractors	8-1-58	7.2. A.8
IP-10-6	De Mattia Tube Curing Stand Safety Hazard	1-30-58	10.2. A.3
IP-10-7	Bagomatic Tire Press Safety	11-4-58	10.3. A.1
IP-10-8	De Mattia Tube Curing Stand Safety Hazard	3-4-59	10.2. A.3
IP-10-9	Serious Accident	5-25-59	Deleted
IP-10-10	Banbury Safe Operating Procedure	9-25-59	8.2. A.1
IP-10-11	Purple "K" Powder for extinguishing Flammable Liquid Fires	12-3-59	Section VII
IP-10-12	Fire Protection and Industrial Hygiene Recommendations for Handling and Storage of Pigment RP-12572	4-6-60	7.2. A.1
IP-10-13	Safety Procedure-McNeil Shear Strip Tire Presses	9-22-60	10.2. D.1



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A. SUMMARY OF RELEASES (CONTINUED)

<u>Number</u>	<u>Title</u>	<u>Date Issued</u>	<u>Manual Location</u>
IP-10-14	Curing Room Accident BOM Shaping	1-17-61	10.2.E.1
IP-10-15	Fatality in Tire Assembly Dept. - Pratteln	4-10-61	10.2.D.2
IP-10-16	Fire Protection - Storage and Handling of Gaseous Hydrocarbons	4-12-62	7.2.A.31
IP-10-17	Frequency of Pressure Vessel Inspections	4-17-62	7.2.B.1
IP-10-18	Horizontal Heater Door - Safety Devices	4-19-62	10.2.A.6
IP-10-19	Fire Prevention Recommendations for Research, Chemical, Physical and Test Laboratories	4-27-62	7.2.A.25
IP-10-20	Safe Handling of Hazardous Materials	4-22-62	8.2.B.1
IP-10-21	Mandatory Inspection for Pressure Vessels	6-20-62	
IP-10-22	Powder Actuated Hand Tools	11-28-62	10.2.C.1
IP-10-23	Issuance of Administration Manual	11-15-63	
IP-10-24	Fire Hazard - Mark IV Narrow WSW Grinder	10-23-63	7.2.A.83
IP-10-25	Fire Protection - Outside Storage of Propane Cylinders	4-3-64	
IP-10-26	Fire Protection - Post Dip Unit Operating Hazards	4-13-64	7.2.A.10
IP-10-27	Tire Curing Press Safety and Insp.	1-4-65	
IP-10-28	Spec. 857S-280 Pressure Switch Calibration on BOM & NAF Tire Curing Presses	12/31/64	



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			Cancels	5/18/65

A. SUMMARY OF RELEASES (CONTINUED)

Number	Title	Date Issued	Manual Location
IP-10-29	Safety Rules & Procedures for Contractor's Employees	1-7-65	5.3.A.1

NOTE: Certain releases, from March, 1965 through July, 1968, although pertaining to the Administration Manual, were numbered in the Index Number Series IP.0 under Interplant Release Method of the Plant Engineer's Manual, Section V, Part 1, Page 5.1.1 but are recorded here to complete the list of Health, Safety Engineering, and Property Protection releases for the Administration Manual.

IP.0-80	Adm. Manual - Vol. I, Ind. Hygiene - Health Hazards & Their Control, Pages 6.2.B.1 thru 6.2.B.3	3/31/65	6.2.B.1
IP.0-82	Adm. Manual - Vol. I. - Ind. Hygiene Health Hazards & Their Control, Page 6.2.C.15, Section VI, Part 2	5/3/65	6.2.C.15
IP.0-83	Adm. Manual - Vol. I - Ind. Hygiene Health Hazards & Their Control, Pages 6.2.A.1 & 6.2.A.2, Section VI, Part 2	5/5/65	6.2.A.1
IP.0-84	Adm. Manual - Vol. I - Interplant Releases - Pages 4.1.A.3 & 4.1.A.4, Section IV, Part 1	5/19/65	4.1.A.3
IP.0-85	Adm. Manual - Vol. II - Accident Producing Physical Conditions and Their Control - Page 10.1.H.1, Section X, Part 1	5/19/65	10.1.H.1
IP.0-87	Adm. Manual - Vol. II - Page 10.1.H.1 Section X, Painting Standards Correction	6/15/65	10.1.H.1
IP.10-30	Plant Engineer's Manual - Vol. II, Safety Warning Lights for In-Plant Vehicles - Page 7.2.C.1	8/20/65	7.2.C.1

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JAN 8 1969

G. L. WILSON
INDUSTRIAL HYGIENIST



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A. SUMMARY OF RELEASES (CONTINUED)

<u>Number</u>	<u>TITLE</u>	<u>Date Issued</u>	<u>Manual Location</u>
IP.0-89	Adm. Manual - Health, Safety, Engineering & Property Protection - Letter on Training Program & Safety Inspections.	8/24/65	
IP.0-90	Adm. Manual - Vol. I - Ind. Hygiene - Health Hazards & Their Control, Page 6.2.C.16.	8/24/65	6.2.C.16
IP.10-31	Administration Manual - Vol. II - Safety Warning Lights for In-Plant Vehicles - Page 10.5.A.1	8/26/65	10.5.A.1
IP.0-92	Adm. Manual - Vol. I - Property Protection, Protection of Property Hazards - Page 7.2.A.9, Section VII, Part 2	1/17/66	7.2.A.9
IP.0-93	Adm. Manual - Vol. I - Industrial Hygiene Health Hazards & Their Control - Pages 6.2.A.3 thru 6.2.A.5	2/18/66	6.2.A.3
IP.0-95	Adm. Manual - Property Protection Protection of Property Hazards - Vol. I Section VIV, Part 2, Page 7.2.A.9	3/2/66	7.2.A.9
IP.0-97	Adm. Manual - Ind. Hygiene - Vol. I Health Hazards & Their Control - Page 6.2.C.17	6/28/66	6.2.C.17
IP.0-100	Adm. Manual - Vol. I - Ind. Hygiene Health Hazards & Their Control - Page 6.2.C.18	9/21/66	6.2.C.18
IP.0-101	Adm. Manual - Vol. I - Ind. Hygiene Health Hazards & Their Control - Pages 6.2.C.19 & 6.2.C.20	9/26/66	6.2.C.19
IP.0-102	Adm. Manual - Vol. II - Safe Handling of Hazardous Materials - Pages 8.2.B.3 and 8.2.B.4	11/7/66	8.2.B.3



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<u>Number</u>	<u>TITLE</u>	<u>Date Issued</u>	<u>Manual Location</u>
IP.10-32	Radiation Type Instrument - Survey to Plant Engineers	12/8/66	
IP.O-104	Adm. Manual - Vol. I - Ind. Hygiene Health Hazards & Their Control - Pages 6.2.A.8 thru 6.2.A.11 & 6.2.C.21	12/19/66	6.2.A.8 & 6.2.C.21
IP.10-33	Radiation Type Instruments - Instruction to all plants on procurement	3/3/67	
IP.O-106	Adm. Manual - Vol. I. - Ind. Hygiene Health Hazards & Their Control - Pages 6.2.B.1 and 6.2.B.2	4/12/67	6.2.B.1
IP.O-107	Adm. Manual - Vol. I - Ind. Hygiene Health Hazards & Their Control - Pages 6.2.A.12 thru 6.2.A.15	6/5/67	6.2.A.12
IP.O-108	Adm. Manual - Vol. I - Ind. Hygiene Health Hazards & Their Control - Pages 6.2.C.22 & 6.2.C.23	6/27/67	6.2.C.22
IP.O-109	Adm. Manual - Vol. I - Engineering Govt. Regulations - Pages 5.1.1 thru 5.1.7	7/19/67	5.1.1
IP.O-110	Adm. Manual - Vol. I - Ind. Hygiene Health Hazards & Their Control - Pages 6.2.B.4 and 6.2.B.5	7/31/67	6.2.B.4
IP.O-111	Adm. Manual - Vol. I - Ind. Hygiene Health Hazards & Their Control - Page 6.3.C.24	12/4/67	6.3.C.24
IP.O-112	Adm. Manual - Vol. I - Ind. Hygiene Health Hazards & Their Control - Pages 6.2.C.1 thru 6.2.C.12	12/13/67	6.2.C.1
IP.O-113	Adm. Manual - Vol. I - Ind. Hygiene Health Hazards & Their Control - Pages 6.2.C.25 & 6.2.C.26	1/25/68	6.2.C.25



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IP.O-115	Adm. Manual - Vol. I - Ind. Hygiene Health Hazards & Their Control - Pages 6.2.A.6 & 6.2.C.27 thru 6.2.C.32	4/30/68	6.2.A.6 & 6.2.C.27
IP.O-116	Adm. Manual - Vol I - Ind. Hygiene Health Hazards & Their Control - Pages 6.2.C.33 thru 6.2.C.35	5/3/68	6.2.C.33
IP.O-117	Adm. Manual - Vol. I - Ind. Hygiene Definition, Scope, Function & Organization - Pages 6.1.1 thru 6.1.5	6/17/68	6.1.1
IP.O-118	Adm. Manual - Vol. I - Ind. Hygiene Health Hazards & Their Control - Pages 6.2.A.16 thru 6.2.A.20	7/16/68	6.2.A.16
IP.10-34	Adm. Manual - Vol. I - Ind. Hygiene Health Hazards & Their Control - Page 6.2.A.1 and 6.2.A.2	2/12/69	6.2.A.1
IP.10-35	Adm. Manual - Vol. I - Ind. Hygiene Health Hazards & Their Control - Pages 6.2.A.1 & 6.2.A.2 revision	5/8/69	6.2.A.1
IP.10-36	Adm. Manual - Vol. I - Ind. Hygiene Health Hazards & Their Control - Pages 6.2.A.20 thru 6.2.A.24	8/1/69	6.2.A.20
IP.10-37	Adm. Manual - Vol. I - Interplant Releases - Pages 4.1.A.4 thru 4.1.A.7 - and - Property Protection, Plant Security - Page 7.2.E.1	12/29/69 12/29/69	4.1.A.4 7.2.E.1
IP.10-38	Adm. Manual - Vol. I - Responsibility For Safe Plant Operation, Communication System - New Page 2.1.B.3 - Manual responsibility assumed by Corporate Safety, Personnel Relations Dept., Akron.	12/29/69	2.1.B.3

Engineering



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A. RADIOACTIVE TYPE GAUGES.

JUL 21 1967

1. Atomic Energy Commission Regulations.

G. L. WILSON
INDUSTRIAL PHYSICIST

The subject of General Licensing, Specific Licensing, and that part of the current Atomic Energy Commission Regulations regarding the posting of Form AEC-3 is complex; therefore, to clarify the overall understanding of the subject in all its aspects, the following summary is presented. The purpose of this summary is to:

- a. Present in one document the essential features of General Licensing, Specific Licensing and requirements relative to the posting of Form AEC-3.
- b. To explain to the Plant Engineers their responsibility with respect to radioactive gauges that are used in the plant.
- c. To inform the Plant Engineers their responsibilities with respect to the maintenance of records as required by AEC regulations.

It is pointed out that there is, and will be, increased activity on the part of the Atomic Energy Commission in making inspections at the plants of various users of radio-isotope gauges. These inspections cover a check of the radioactive gauge and its surroundings to determine that radiation levels are within certain limits and checking the records that must be maintained.

2. General Licensing.

Following is a general summary of licensing requirements and portions of the Atomic Energy Regulations that apply to Firestone's use of radioactive gauges.

General Licensing is a type of licensing procedure which has been established to simplify the distribution of certain radioactive gauges. It applies to gauges that contain the radioactive source in a sealed capsule form which emits radiation at a level considerably below that which is harmful to human beings if subjected to such radiation for prolonged periods of time. Under this system, a vendor is permitted to distribute such gauges to various customers at his discretion,



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A. RADIOACTIVE TYPE GAUGES (Continued)

but to do this, it has been necessary for him to obtain a Specific License. In order that he may qualify for the Specific License required, he has had to satisfy certain stringent requirements relative to the manufacture and safety of the radioactive material in question. Once a user has obtained a radioactive gauge under the General Licensing procedure, he has certain responsibilities as follows:

a. To Insure that Semi-Annual Source Inspections are Conducted.

In this case, the inspection must be made by persons licensed to do so. The most straight forward method to handle this is to have the vendor conduct the tests.

b. Maintain Records of All Tests Which Have Been Performed.

Such records should show the date on which the test was performed, the name of the person who conducted the test, and the results. Other records which must be maintained are those pertaining to the results of initial radiation surveys that were made at the installation site. These records should have been furnished by the vendor at the time when the gauge was put on the General Licensing basis.

c. To Report any Incidents Which May Have Damaged the Radioactive Source and To Report the Theft or Loss of Such Radiation Material.

The specific responsibilities of the user in this connection are outlined in Part 20, titled "Standards for Protection Against Radiation", Title 10, Atomic Energy Rules and Regulations reprinted from the Federal Register. (An up-to-date copy of these Rules and Regulations should be maintained in your files.)

3. Specific Licensing.

Radioactive type instruments which do not qualify for General Licensing, usually because of their inability to meet the requirements of radiation limits, may be obtained on a Specific License. Under this system, it is necessary for the user, and not the vendor, to make application to the Atomic Energy Commission for such a license. Usually the vendor of such equipment will provide the necessary forms and most of the information that is to be included in these forms. If the application is approved, a Specific License is granted for a two year period. Renewal of



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A. RADIOACTIVE TYPE GAUGES (continued)

the license is generally a routine matter requiring submission of an application form in which the basic data as included in the original application is repeated.

When a radioactive gauge has been obtained on a Specific License basis, the user is bound by all of the regulations of Part 20, Title 10 of Atomic Energy Rules and Regulations.

A gauge under Specific Licensing carries the same requirements for semi-annual source inspections as those obtained under General Licensing. However, in this case, it is the user's direct responsibility to have such tests made and to maintain complete records relative to these tests. Also, as in the case of the General License gauges, it is necessary to report thefts or loss of radioactive material, and any incidents which may lead to damage of the source as outlined in Part 20.

4. Regulations Covering the Posting of Form AEC-3.

The section titled "Instruction of Personnel; Posting of Notices to Employees", of Part 20, applies to the posting of notices to employees. With respect to General Licensed Gauges, the following is quoted from Part 31, "General Licenses for Certain Qualities of By-Product Material and By-Product Material Contained by Certain Items", Section titled, "Certain Measuring, Gauging or Controlling Devices.":

"Persons who own, receive, acquire, possess or use a device pursuant to the general license in this Section: shall be exempt from the requirements of Part 30 of this chapter, except that certain persons shall comply with the provisions of section (Reports of theft or loss of licensed material) and (Notification of incidents) of this chapter." From this, it is apparent that posting of Form AEC-3 is not required for General Licensed Gauges."

In the case of gauges which are obtained on a Specific Licensing basis, all sections of Part 20 will apply.

In regard to the posting of Form AEC-3 in relation to Specific Licensed Gauges, the following is quoted from Part 20, Section titled, "Instruction of Personnel, Posting of Notices to Employees":



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A. RADIOACTIVE TYPE GAUGES (continued)

"Form AEC-3 shall be conspicuously posted in a sufficient number of places in every establishment where employees are employed in activities licensed by the Commission to permit employees working in or frequenting any portion of a 'restricted' area to observe a copy of the way to or from their place of employment."

Thus, by "reverse definition", (i.e., an "unrestricted area" is defined as an area which is not classified as a "restricted area") it is clear that posting of Form AEC-3 is not required in an unrestricted area.

To further define an "unrestricted area", the following is quoted from Part 20, section titled, "Permissible Levels of Radiation in unrestricted areas":

"Except as authorized by the Commission pursuant to Para. (a) of this section, no licensee shall possess, use or transfer licensed material in such a manner as to create in any unrestricted area from radioactive material and other sources of radiation in his possession:

- (a) radiation levels which, if an individual were continuously present in the area, could result in his receiving a dose in excess of two millirems in any one hour, or,
- (b) Radiation levels which, if any individual were continuously present in the area, could result in his receiving a dose in excess of 100 millirems in any seven consecutive days."

Therefore, to avoid the necessity of personnel monitoring and posting Form AEC-3, Firestone's policy has been to insure that all areas containing radioactive gauges can be classified as "unrestricted" by keeping the radioactive levels below two millirems per hour. In order to confirm this, independent third party radiation surveys have been made on all gauges obtained under a Specific License.



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A. RADIOACTIVE TYPE GAUGES (continued)

5. Form AEC-3.

As previously outlined, Firestone's policy has been to avoid the requirement of posting Form AEC-3; however, there may be future installations where it may be necessary. For this reason, certain sections of Part 20 are quoted below for your information.

(a) Date of Revision:

Form AEC-3 has been subject to some revision. If it should be necessary to use subject Form, check for current edition.

(b) Reports on Your Radiation Exposure History.

(1) "The AEC regulations require that your employer give you a written report if you receive an exposure in excess of any applicable limit set forth in the regulations or in the license. The basic limits for exposure to employees are set forth in Part 20 of the Regulations. These sections specify limits on exposure to radiation and exposure to concentrations of radioactive material in the air.

(2) If you work where personnel monitoring is required. Pursuant to Part 20:

a. Your employer must give you a written report of your radiation exposures upon the termination of your employment if you request it, and

b. Your employer must advise you annually of your exposure to radiation if you request it."

(c) Posting Requirement.

"Copies of this notice must be posted in a sufficient number of places in every establishment where activities licensed by the AEC are conducted, to permit employees working in or frequenting any portion of a restricted area to observe a copy on the way to or from their place of employment."



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Part 1. GOVERNMENT REGULATIONS

Date 7-10-67
Cancels 9-12-62

A. RADIOACTIVE TYPE GAUGES (continued)

(d) Unrestricted Areas.

As indicated, requirements for personnel monitoring are outlined in Part 20 of the Regulations. It can be seen that monitoring is required for certain circumstances in restricted areas. Thus, it is not necessary for unrestricted areas. Similarly, the posting of Form AEC-3 is not required in unrestricted areas.

6. Firestone Policy.

Firestone's policy relative to the use of radioactive gauges and in compliance with Atomic Energy Commission Regulations is as follows:

- (a) Whenever possible, radioactive gauges are to be obtained on a General License basis. Generally, all calender beta gauges are on this basis. Liquid level gauges and density gauges, for the most part, emit radiation levels that are too high to qualify for General Licensing, and therefore, require Specific Licenses.
- (b) In order to avoid the posting of Form AEC-3 and the use of personnel monitoring devices, each gauge is so made that no restricted areas exist.

7. Summary.

Title 10 of the Atomic Energy Rules and Regulations which governs the use of radioactive Type Gauges is frequently revised and updated. Pursuant to Interplant Release No. I.P. 10-33, The Engineering Laboratory is responsible for checking compliances with subject rules and Regulations, and will notify the individual plants if revisions are made to the subject rules which will affect Firestone's policy in regards to radioactive instruments.

It should also be the responsibility of those using gauges to keep the Engineering Laboratory fully informed of any rules and regulation changes on a state of local level which might affect Firestone's policy.



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A. RADIOACTIVE TYPE GAUGES (continued)

The above information is based on Federal AEC control within the state. Some states (California, Texas, etc.) have an agreement with the AEC under which the state assumes part of AEC's regulatory authority over the use of radioactive materials in that state. Generally, the state regulations are basically identical to the Federal regulations; however, where a user is within a state which has regulatory control, the user must obtain and follow that state's regulations.



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		Cancel None

A. SAFETY RULES AND PROCEDURES FOR CONTRACTOR'S EMPLOYEES (IP. 10-29)

In order to promote uninterrupted progress to both the regular plant operations and new installations and provide maximum safety to all personnel, the following plant rules are to be observed by the Contractor's employees:

1. Smoking is prohibited at all times within or adjacent to the plant. An area at a safe distance from plant will be designated for this purpose. Lighters or matches are not to be struck except in designated smoking area.
2. Safety glasses and hard hats, provided by Contractor are to be worn at all times in the plant. Protective clothing should also be worn as necessary.
3. Keep working area as clean as possible at all times. Do not allow refuse and debris to accumulate. Pile materials neatly and safely, at safe distance from hot piping, and off roadways and walkways. Do not leave tools or materials on steps, walkways, platforms or elevated equipment or pipes. Remove lumber with protruding nails to safe area and remove or bend nails over.
4. Materials are not to be thrown or dropped from scaffolds or other overhead areas.
5. Oily rags and waste are to be disposed of in metal containers and removed daily.
6. Spills of any materials creating hazards are to be cleaned up immediately.

* * * * *

7. Fire lanes and aisles to fire fighting equipment are to be left unobstructed at all times.
8. Material is never to be piled in front of fire extinguishers, fire doors, hydrants, or manhole covers.
9. All electrical equipment used must be properly grounded.
10. Any lights carried into and used in hazardous locations must be approved explosion-proof type. These areas use only Class I, Group D type equipment.
11. Use of Powder Actuated tools is prohibited.

* * * * *

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DR. L. H. BALLOU



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12. All ladders, scaffolding, hoisting equipment, fork lift trucks, must conform to ASA Safety Code and State Codes. Ladders should be marked with Contractor's identification to prevent mixing with ladders belonging to the Company, as well as any other equipment. All Contractor's equipment must be removed on completion of job.
13. Before any hot work is started in an operating area, approval must be obtained from Plant Protection. Hot work includes:
 - a. All welding.
 - b. Torch cutting.
 - c. Soldering.
 - d. Melting of metals.
 - e. Any operation where open flames or sparks are present.
 - f. Electric drills and air hammers.
14. A Company fireman will stand by whenever it is necessary to do hot work in an operating area. He is authorized to stop the work if conditions so warrant until it is safe to proceed again.
15. Burning and welding is to be done by personnel skilled in these trades, properly equipped, and aware of safety requirements.
16. Whenever welding or cutting is done, proper shields are to be used to protect all other personnel within the dangerous area from eye injury.
17. Necessary precaution and protection is to be exercised to prevent fires and damage from falling sparks from welding and cutting operations. This must be done before the Plant Protection Department's O.K. will be given for any hot work.
18. All acetylene and oxygen cylinders that may be used must be properly supported when standing upright. When hoses and valves are removed from cylinders, the protective cap is to be installed on all tanks whether empty or full. Acetylene cylinders, when in use, must have a wrench on the valve.

* * * * *

19. Areas where overhead hazards, excavations, or other unsafe conditions exist must be properly blocked off with appropriate warning signs.



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In the case of excavations, barricades must be provided. Night lights shall be provided.

20. Precautions must be exercised to prevent injury to regular plant employees. This applies particularly to any operation of trucks and power equipment.
21. In the event a leak of oil, gas or vapor is caused or discovered, report it at once to nearest plant employee with request that he immediately inform proper Fire Department and/or Safety Department.
22. Written authorization shall be obtained from Fireman and Project Engineer, together with instructions regarding special precautions to be taken in the event any of the following operations become necessary:
 - a. Entering any tank or closed vessel.
 - b. Entering any deep pit, trench, or other enclosed area.
 - c. Cutting into a pipeline of any kind whatsoever.
 - d. Drilling, chipping, grinding, or any other work which may produce flames or sparks.
 - e. Making air or water connections to any line containing oils or chemicals.
 - f. Operating gas engine, open electric motor, switch, or plug-in connection in any area.

* * * * *

23. Employees will enter Company property and proceed to job site through gate and over road to be designated to Contractor prior to starting job.
24. Parking area for Contractor's employees will be designated to Contractor prior to starting job.
25. Contractor's employees will not enter Company property prior to twenty (20) minutes before scheduled starting time.
26. Identification badges for all employees must be secured and displayed to Gate Guard on duty.
27. Employees entering or leaving job site, other than at shift change,



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will require a gate pass approved by authorized personnel.

28. A Package Pass, properly approved, must be secured to remove any personal property other than lunch boxes and clothing, from the job site. Any non-personal article must also be accompanied by a Package Pass. Packages, lunch boxes, clothing, may be inspected by Guard at Gate as employee leaves.
29. Contractor's employees must stay in assigned area at job site and not visit other areas unless authorized to do so by Company representative.
30. Use of toilet and washroom facilities is restricted to those designated for Contractor's use.
31. Soliciting, selling of any merchandise, or distribution of any literature for any cause, without permission of Management, is forbidden on Company property.
32. Gambling or intoxicating liquor in any form are forbidden at any time on Company property.
33. Use of Company telephones is restricted to business calls only, and is not to be used for personal calls.
34. Horseplay, throwing any object, and scuffling are dangerous and strictly forbidden.
35. Contractor is to designate Hospital to which his personnel are to be taken in the event of an injury.

* * * * *

Due regard for good safety practice is to be exercised at all times. Work should be done in a manner so as to protect fellow employees and equipment. Safety equipment only should be used, and used in a safe manner. Unsafe conditions such as obstacles in walkways, improperly made electrical connections, unstable piling of materials, loose material overhead, and tripping hazards should be avoided.

The foregoing rules are for the protection of both Contractor's employees and those of the Company. Full cooperation in observing all rules is required.

THE FIRESTONE TIRE & RUBBER COMPANY
AKRON, OHIO

PFK/oj
1-7-65

Signal.

No. R8710

**LOS ANGELES-CHICAGO-LOS AN, OR
BOSTON, TX-LOCUST GROVE, GA
U.S.A.**



ADMINISTRATION MANUAL

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DEFINITION, SCOPE, ORGANIZATION, AND FUNCTION OF INDUSTRIAL HYGIENE

DEFINITION

Industrial Hygiene is the science and art devoted to the recognition, evaluation, and control of those environmental factors or stresses, arising in or from the workplace, which may cause sickness, impaired health and well being, or significant discomfort and inefficiency among workers. The emphasis is on prevention of illness.

SCOPE

The scope of industrial hygiene includes:

1. Knowledge and recognition of the environmental factors which affect the worker. This includes knowledge about the toxicity and expected effects of excessive exposure to solid, liquid, and gaseous chemicals in the form of dusts, gases, mists, fumes, and vapors. It also includes knowledge about physical agents such as noise, heat, light, and ionizing radiation.
2. Evaluation of these factors by quantitative measurement of their magnitude.
3. Recommendations for methods of control or reduction, when necessary.

In actual practice, it is impracticable, unnecessary, and may be impossible for the user to avoid all contact with chemicals. The practical approach is to keep exposure to a minimum. This can be accomplished by:

1. Engineering control
2. Good housekeeping
3. Careful handling on the part of the individual user



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Date 6-17-68
Cancels None

THRESHOLD LIMIT VALUE

For many chemicals, there is a guide used to evaluate whether a hazardous air concentration is present. This guide is the Threshold Limit Value. It is used as an aid in determining whether:

1. There is an inhalation hazard
2. Skin and mucous membrane absorption from direct contact may contribute to overall exposure.

The Threshold Limit Value:

1. Refers to the airborne concentration of a substance and represents conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse effect.
2. Is used as a guide, not as a fine line between a safe and a dangerous concentration.

TOXICITY AND HAZARD

It is important to make a distinction between TOXICITY and HAZARD:

1. The TOXICITY of a chemical is defined as its capacity for producing injury.
2. HAZARD is the possibility that injury can result from the use of a chemical in the quantity and manner proposed. The term carries the connotation of "risk" or "chance."

The industrial hygienist must take the position that all chemicals have some degree of toxicity and that all chemicals can be used without hazard if proper precautions are taken.



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Part 1 DEFINITION, SCOPE, FUNCTION, & ORGANIZATION

Date 6-17-68
Cancels None

Toxicity is often expressed as the quantity of a material required to produce a given effect. One scheme ~~used~~ used by the Industrial Hygiene Department as a frame of reference is:

Commonly Used Term	4-hour Vapor Exposure Causing 2 to 4 Deaths in Group of 6 Rats (ppm*)	Probable Lethal Dose for Man
Extremely toxic	Less than 10	Taste (1 grain)
Highly toxic	10 to 100	1 tsp. (4 cc)
Moderately toxic	100 to 1,000	1 oz. (30 gm)
Slightly toxic	1,000 to 10,000	1 pint (250 gm)
Practically nontoxic	10,000 to 100,000	1 quart
Relatively harmless	More than 100,000	More than 1 quart

*ppm - parts per million parts of air

The hazard associated with the use of a chemical depends on:

1. Its toxicity
2. The physical state under conditions of use
3. How much is being used
4. The manner of use which determines the dose and the route by which it enters the body.



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Cancels None

Following are two examples which illustrate these factors:

1. A pint of carbon tetrachloride in the hands of a "bull in the china shop" may be much more hazardous than a barrel of carbon tetrachloride properly handled by an experienced, cautious worker. When the quantity used is one drop, the hazard is practically non-existent even for the "bull in the china shop." The important thing is not how much is used, but how much goes onto and into the user.
2. A warehouse is filled with lead metal in the form of pigs. The total quantity of lead in a warehouse with 1 million cubic feet of space might be 170,000 tons. The lead is highly toxic. As long as these lead pigs just sit there, no hazard arises. Now presume that some of the lead is ground up into very fine dust and becomes airborne throughout this same space. Only about 1/100 of a pound (two-tenths of an ounce) is required to produce an air concentration which is the maximum safe level for prolonged inhalation exposure 8 hours each day. Thus it is seen that a very large quantity of a toxic chemical may produce no hazard; but that under different conditions, a very small quantity of the same one may be hazardous.

ORGANIZATION AND FUNCTION

The Industrial Hygiene Department is organized as part of the Medical Division in the Home Office in Akron.

It makes industrial hygiene surveys on its own initiative and upon request by management. These surveys include air sampling and analysis for air contaminants and on-the-spot consultation with management personnel, followed by a written report of findings which includes recommendations for correction of hazardous conditions.



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Cancels None

and physical agents
CAPS → It is very important that the industrial hygienist be informed in advance of the specific chemicals that should be evaluated during his visit. The reason for this is simply that he must select and bring to the plant the proper instruments required to evaluate the chemicals in question.
matter *+ physical agents*

The Industrial Hygiene Department invites written or verbal inquiries about specific chemicals, their toxicity, and ~~handling~~ *the* precautions which should be used to minimize the hazards. With a sufficiently detailed description about the manner in which they will be used, we can advise about the hazards which can arise. (For a more complete discussion, refer to "SAFE HANDLING OF HAZARDOUS MATERIALS" in Section 8, "Safety," of this Manual.)
ing has to be done



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Part 2 HEALTH HAZARDS AND THEIR CONTROL

Date
Cancels

A. ENVIRONMENTAL CONTROL OF HEALTH HAZARDS

*Industrial Hygiene
Part 2*

CLEANING SOLVENTS

General

There are many solvents, some of which are mixtures of two or more chemicals, marketed for machinery cleaning and general cleaning. Health and fire hazards develop when they are used in a manner other than as intended.

Control of Hazards

Cleaning solvents shall have a low health and fire hazard, and shall be used in a manner which minimizes the hazards. Spraying shall be done only with local exhaust ventilation (spot ventilation), as spraying normally produces a large quantity of vapor. Spraying increases the inhalation hazard, and the fire hazard of flammable solvents.

When practical, the items to be cleaned should be removed to a central cleaning station provided with local exhaust ventilation. Where cleaning must be done in place, the possibility of inhalation exposure increases.

Approved Cleaners

Code 321
RP-11371
RP-12045
RP-12400
RP-13020
AK-259

CHEMICALS WITH A FLASH POINT BELOW 105°F (CLOSED CUP) WILL NOT BE USED AS CLEANING SOLVENTS.

The above materials should be evaluated before more expensive commercial mixtures are considered.

Revised layout.

S-4273-M

The Firestone Tire & Rubber Company



KQA = Eliminate

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~~Part 2 HEALTH HAZARDS AND THEIR CONTROL~~

Date 5-8-69
Cancel 6.2.A.1 dated 2-12-69

A. ENVIRONMENTAL CONTROL OF HEALTH HAZARDS

OK, but
- not repeated on every page

3-4 Lines CLEANING SOLVENTS - don't underline
③ 1. ~~***~~ Approved Cleaners ~~***~~ Center-

Code 321

~~RP-8593~~ Change to RP 11371 (xylene) next printing

RP-12045

RP-12400

RP-13020

AK-259

~~CARS~~
Chemicals with a flash point below 105°F (closed cup) will not be used as cleaning solvents.

① 2. General ~~COMMON~~ MIXTURES ARE CONSIDERED. ~~THE ABOVE MATERIALS SHOULD BE EVALUATED BEFORE MORE EXPENSIVE~~

There are many solvents, some of which are mixtures of two or more chemicals, marketed for machinery cleaning and general cleaning. Health and fire hazards develop when they are used in a manner other than as intended.

② 3. Control of Hazards

Cleaning solvents shall have a low health and fire hazard, and shall be used in a manner which minimizes the hazards. Spraying shall be done only with local exhaust ventilation (spot ventilation), as spraying normally produces a large quantity of vapor. Spraying increases the health hazard, and the fire hazard of flammable solvents. ~~INHALATION~~

When practical, the items to be cleaned should be removed to a central cleaning station provided with local exhaust ventilation. Where cleaning must be done in place, the possibility of inhalation exposure increases.

Old Layout

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JUN 2 1969

G. L. WILSON
INDUSTRIAL HYGIENIST

3-6-69

S-4273-M

The Firestone Tire & Rubber Company

SUBJECT TO DISCLOSURE RESTRICTION

40708



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2-12-69

A. ENVIRONMENTAL CONTROL OF HEALTH HAZARDS

CLEANING SOLVENTS (continued)

Whether overexposure occurs depends on many factors:

- a. Evaporation rate
- b. Chemical composition
- c. Quantity and manner in which used
- d. Length of time involved
- e. Frequency of use
- f. The size and general ventilation of the workplace

Exposure can be reduced or prevented by the most favorable combination of the above factors and by prevention of spillage.

Inhalation can be prevented by the use of respiratory ^{protective devices} protection, but workmen should not be expected to wear such equipment for prolonged periods when other means of control are practical.

4. Special Operations

This directive does not apply to degreaser tanks manufactured for use with a specific solvent and used in production operations for metal degreasing.

See Metal Degreasers, page 1
Presently there are materials other than those listed above which have been approved for specific cleaning operations. Those uses may continue, but such materials must not be diverted to other uses without approval from the Industrial Hygiene Department.



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A. ENVIRONMENTAL CONTROL OF HEALTH HAZARDS ✓

INDUSTRIAL X-RAY UNITS

FEB 25 1966

G. L. WILSON
INDUSTRIAL HYGIENIST

1. General

No threshold (no effect level) for ionizing radiation has been generally accepted. There is a normal "background" radiation to which man is always subjected. Radium and uranium in the earth's crust, cosmic rays, and naturally occurring radioactive potassium contribute to background radiation. It varies with geographical location and altitude.

In recent years there has been an increase in potential ionizing radiation exposure from the use of man-made radioisotopes and from equipment such as x-ray units which also produce ionizing radiation. It is desirable to limit exposure from all man-made sources to as low a level as is practical.

2. Permissible Levels

At present the maximum permissible exposure for radiation workers in the United States is 100 millirem (mrem) per week. For others it is 10 mrem per week. This maximum permissible exposure for radiation workers has been lowered twice in recent years. Should it be changed again, it is likely there would be a further reduction.

3. Safe Operation Rules

1. Upon installation the vendor shall make a radiation survey of the x-ray unit to insure that personnel are not overexposed; applicable regulations or the recommendations of the National Bureau of Standards Handbook 59, "Permissible Dose from External Sources of Ionizing Radiation" shall be used. The vendor is to forward a copy of the survey report to the Industrial Hygiene Department in Akron.

As soon as practicable after installation, a radiation survey will be made by the Industrial Hygiene Department or by an independent qualified expert.

3. Radiation surveys shall:

(1) Be made with an instrument capable of accurately measuring x-radiation well below 2.5 mr/hr.

(2) Include measurements above and below the x-ray unit, unless the unit is on the ground floor, when located between floors.



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A. ENVIRONMENTAL CONTROL OF HEALTH HAZARDS

INDUSTRIAL X-RAY UNITS

Subsequent surveys shall be made as required. If changes are made in the unit or enclosure housing it, report them to the Industrial Hygiene Department, as a re-survey may be desirable. *A survey is also required if the enclosure housing the unit is damaged.*

4. The doors(s) to the enclosure(s) housing the x-ray unit shall be equipped with adequate interlock device(s) which make the unit inoperable unless the door(s) are completely closed. The door(s) shall be provided with knobs or handles on the inside of the enclosure so that anyone ~~locked inside~~ *accidentally* can leave the enclosure without delay.

5. Normally only the operator will be permitted in the control room while the x-ray unit is activated.

6. Operators shall wear a device which measures exposure. Usually this will be a film badge changed at regular intervals. The period of time between changes will be determined by the Industrial Hygiene Department. Prior to the installation of a unit, contact the Industrial Hygiene Department, stating the number of operators involved, and the necessary forms will be furnished so that the purchasing department can order the badges.

7. Federal, state or local government regulations take precedence over this guide where (1) there is a conflict or (2) the regulations are more binding.



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A. ENVIRONMENTAL CONTROL OF HEALTH HAZARDS

FEB 25 1966

INDUSTRIAL X-RAY UNITS

Requirements G. L. WILSON
and Regulations INDUSTRIAL HYGIENE

In addition to the requirements established by the United States Atomic Energy Commission Regulations, some other governmental bodies have ~~requirements~~ requirements covering devices which emit ionizing radiation. These requirements may cover radioactive isotopes including radium, and equipment which emits x-rays. They sometimes include registration of such equipment. *Make certain that such Regulations are complied with.*

Typical devices include level and thickness gauges using radioactive substances, industrial x-ray units, x-ray diffraction units, and devices used in systems for fire protection.

~~You should~~ *Make certain that your operations involving ionizing radiation comply with applicable regulations.*

Refer to Vol. I, Sec. V, Part 1, page 5.1.1 for Atomic Energy Commission licensing requirements relative to radioactive gauges, and to Vol. I, Sec. VI, Part 2, page 6.2.A.3 for other requirements on industrial x-ray units.

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~~A. ENVIRONMENT CONTROL FOR HEALTH~~

INDUSTRIAL VENTILATION

The standards of industrial ventilation to be followed in engineering design are presented in the manual -

INDUSTRIAL VENTILATION - A Manual of Recommended Practice

This publication is available from:

Committee on Industrial Ventilation
American Conference of Governmental Industrial Hygienists
P. O. Box 453
Lansing, Michigan, 48902, U.S.A.

9th Edition of the manual is in use
The 9th Edition of this manual has recently been published. It is a valuable addition to the library of engineers concerned with ventilation problems. *and all plants should have a copy*

The cost is \$4.

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MAY 3 1968

G. L. WILSON
INDUSTRIAL HYGIENIST



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Part

2. HEALTH HAZARDS AND THEIR CONTROL

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A. ENVIRONMENT CONTROL FOR HEALTH

average concentrations of air-borne particulate matter

Particulate load is one of the most important factors influencing the selection of air cleaners. For that reason we are including on this page a graph which shows the average concentrations of air-borne particulate matter under a wide range of industrial conditions.

Particulate loads are commonly classified as:

1. Light Load—0.1 to 1 grain per 1000 cu. ft.
2. Medium Load—1 to 1000 grains per 1000 cu. ft.
3. Heavy Load—1000 grains and up per 1000 cu. ft. 1 grain per 1000 cu. ft. = 2.3 mg. per cubic meter = 2.3 micrograms per liter. One milligram is equivalent to 0.013432 grains. As a comparison, the concentration of the U. S. Bureau of Mines silica dust test is approximately 22 grains per 1000 cu. ft. of air.

Normal load ranges may be listed as follows:

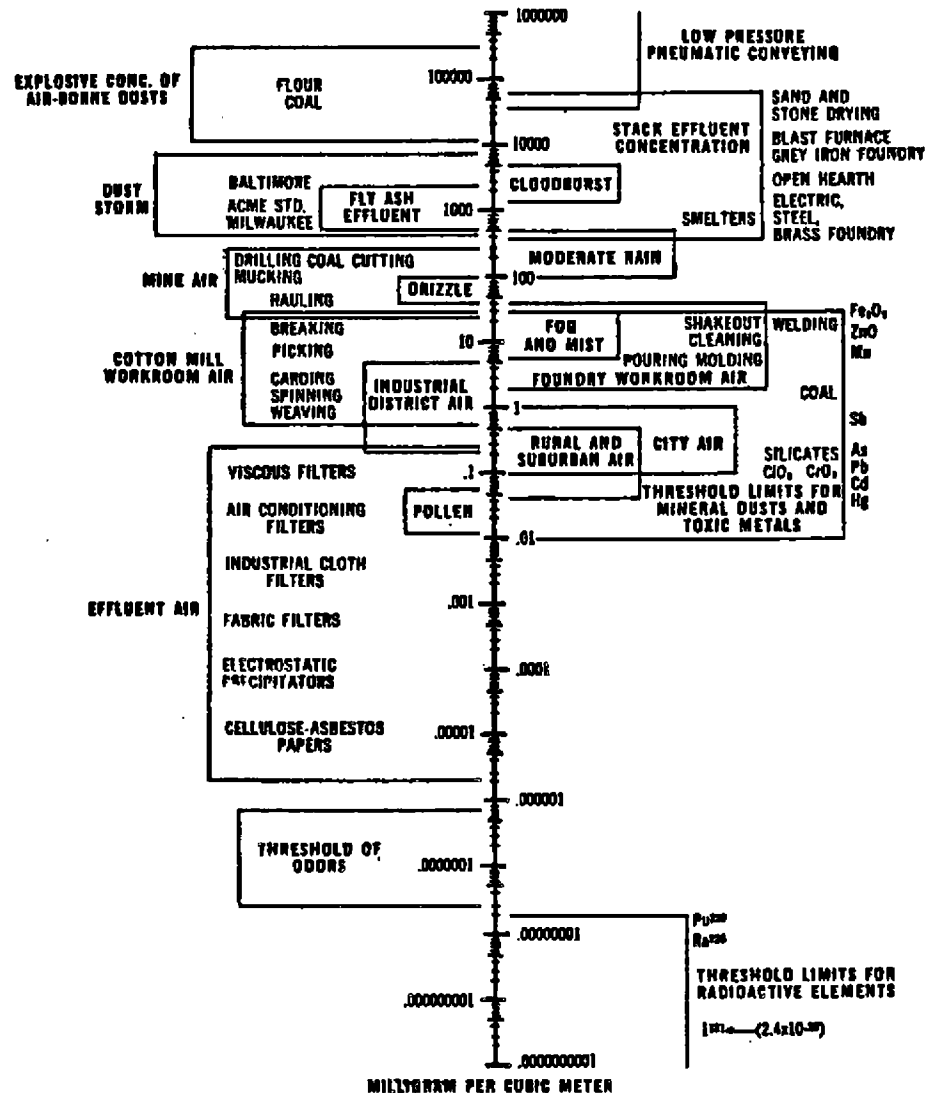
1. Country Air—0.2 grains per 1000 cu. ft.

2. Small Town—0.2 to 0.4 grains per 1000 cu. ft.
3. City Res.—0.4 to 0.8 grains per 1000 cu. ft.
4. City Ind.—1.0 to 2.0 grains per 1000 cu. ft.
5. Ind. Operations—4.0 to 8.0 grains per 1000 cu. ft. 7000 grains = 1 lb.

In general, the Particulate Cleaner types can be grouped as follows with respect to load condition:

1. Heavy Loads—Gravity Separators, Cyclone Separators, Sonic Collectors.
2. Medium Loads—All of the above plus Bag Filters, Impingement Type Box Filters, and Wet Collectors.
3. Light Loads—Box Filters of both types and Electrostatic Precipitators.

When MSA Ultra-Aire Filters are used in conditions of heavy or medium loads, one or more of the other types must be used ahead of it to reduce the load to a practical level.



S-4275-M

The Firestone Tire & Rubber Company

DRAFT

August 25, 1970

(The following will replace the present issue on calibration in Administration Manual.)

~~(INDICATORS)~~
CALIBRATION - COMBUSTIBLE GAS DETECTORS

Combustible gas detectors should be checked for proper response at least every six months or whenever inaccurate response is suspected. Instruments which do not show proper response should be repaired.

The response of such instruments can be checked in a few minutes by using commercial test kits, two of which are:

1. J-W Gas Indicator Test Kit, complete. Cost \$5.60.
Catalogue No. 550-075. Johnson-Williams, Inc.,
Mountain View, California
2. MSA Calibration Test Kit, Part No. 454380, Cost \$7.50.
Mine Safety Appliances Company, Pittsburgh, Pennsylvania.

Contact your local ^{safety} supply houses to obtain one.

Either of these test kits can be used to check the calibration of combustible gas indicators of any manufacturer with reasonable accuracy.

GLW:ss



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HEALTH, SAFETY ENGINEERING & PROPERTY PROTECTION

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A. ENVIRONMENTAL CONTROL OF HEALTH HAZARDS

CALIBRATION OF GAS DETECTION INSTRUMENTS

Many brands and types of gas analyzing instruments which show the results by a needle reading are in use for the purpose of determining the air concentration of flammable gases. Many plant protection departments have one. It is important that the instrument manufacturer's instructions be followed closely in the use of these instruments in order to obtain valid results. It is also important to make certain that the instrument is in calibration.

A calibration should be made at least once a year, either in the plant or by the manufacturer. It may be made more often, particularly if malfunction is suspected. It is entirely possible for instruments to respond in an apparently normal fashion but to give erroneous readings.

If the instrument is checked on a known vapor concentration of one substance, say hexane, and found to be in calibration, it is highly likely that it is also in calibration for other flammable vapors for which it is useful. This is because one calibration checks the filament as well as the other instrument components.

Outlined herewith is a calibration procedure which may be used in your plant. You should consult with your Chief Chemist on its use.

CALIBRATION PROCEDURE

This procedure outlines a method for checking the calibration of gas analyzing instruments by passing a known concentration of a vapor-air mixture through the instrument. The method is approximate and usable only with liquids which vaporize easily at room temperature. Good and consistent results can be obtained when the proper consideration is given to the variables involved.

The known sample mixture is prepared in a vessel of a size suitable to produce a volume of vapor in air considerably in excess of the flow requirements of the instrument being calibrated. It has been found that a 5-gallon carboy has sufficient volume for most instruments, but in some cases where the instrument requires a flow as high as 0.2 CFM it is necessary to make up the known concentration in two vessels and arrange the flow of sample so that the atmosphere from one vessel is used to replace the atmosphere in the second vessel.



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Cancels None

A. ENVIRONMENTAL CONTROL OF HEALTH HAZARDS

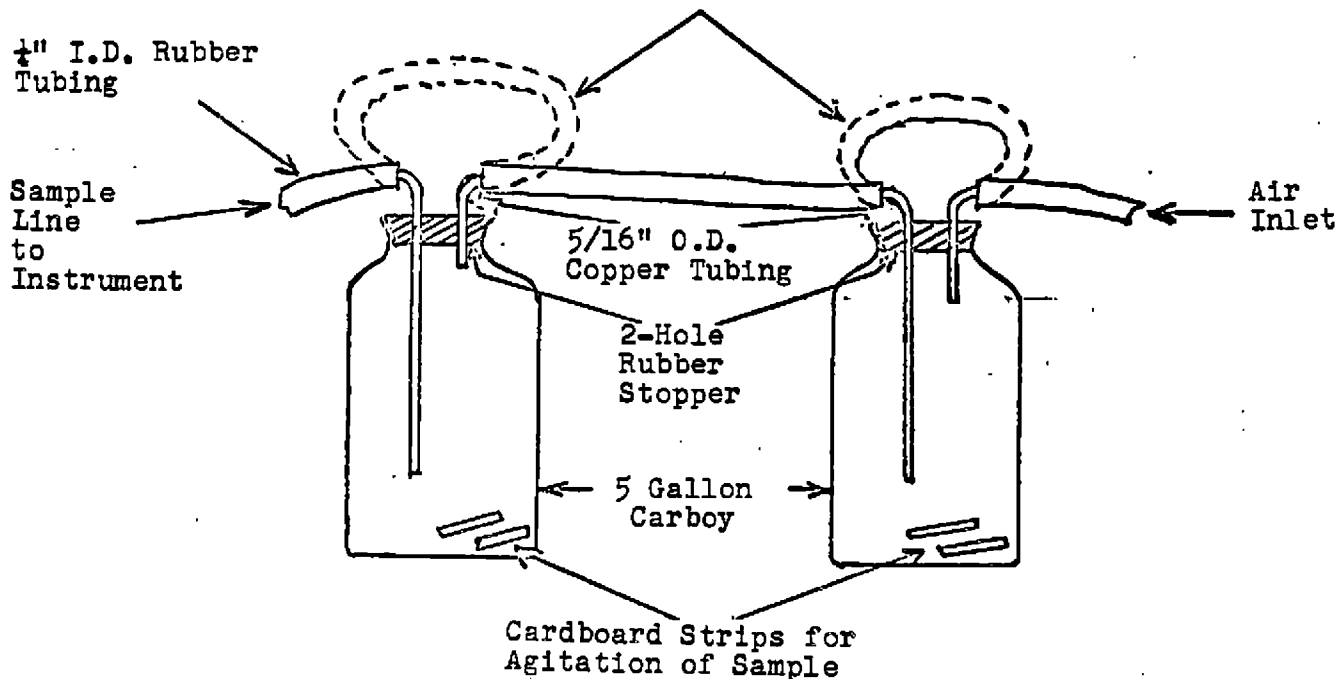
CALIBRATION PROCEDURE - Continued

The volume of the container (V_c in the formula below) is obtained accurately by determining the amount of water required to fill it up to the bottom of the rubber stopper. The container should be dry and purged of any combustible contaminants before it is used. Purge the container by blowing compressed air through it for about 10 minutes between succeeding sample mixtures. Place strips of cardboard (4 or 5) about 1" wide and 5" long in the container after the liquid material has been injected and vaporized.

A convenient means of sealing the container while the sample mixture is being prepared is to disconnect the rubber tubing (used for conducting the sample from the bottle to the instrument) from the instrument and connect it to the inlet tube of the container.

The following sketch illustrates the recommended arrangement of the apparatus when two carboys are used. The inlet and outlet tubes from the vessels are shown arranged for a vapor which is heavier than air, as are the vapors of the substances shown below.

Position of Tubing for Sealing Vessels



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A. ENVIRONMENTAL CONTROL OF HEALTH HAZARDS

CALIBRATION PROCEDURE - Continued

When the container is ready for introducing the liquid which is to be vaporized, the rubber stopper is lifted out and the desired quantity of liquid is measured (with pipette) into it. Replace the rubber stopper immediately and allow to stand until all the liquid has vaporized. Pick up container and turn it up and down for a minute or two. The falling card-board will mix the vapor and air. The rubber tubing is then disconnected from the container outlet and connected to the instrument sample inlet. As sample from the container is aspirated through the instrument, air is drawn into the container and gradually displaces the vapor-air mixture. This displacement, or dilution, is apparent by a gradual decrease in the instrument reading. The instrument reading is compared with calibration data in the instrument instruction book.

The volume of liquid (V_1) to be vaporized in the container to give the desired concentration of vapor in air is computed from the following formula:

$$V_1 = \left(\frac{CV_cM}{(D_1 \times 2,241,200)} \right) \times \left(\frac{273}{(273 + T)} \right) \times \left(\frac{P}{760} \right)$$

Where:

V_1 = Volume of liquid material in milliliters

C = Desired vapor concentration in air in per cent by volume.

V_c = Volume of container in cubic centimeters.

M = Molecular weight of material.

D_1 = Density of liquid material in grams per cubic centimeter

T = Room temperature in °C.

P = Barometric pressure in mm. Hg.

EXAMPLE

Required: The amount of liquid pentane to be introduced into a vessel of 30 liters capacity in order to produce a mixture which is 100% of the lower Explosive Limit (L.E.L.) of pentane in air.



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A. ENVIRONMENTAL CONTROL OF HEALTH HAZARDS

EXAMPLE - Continued

D_1 - Density of liquid pentane - 0.6262 grams per cubic centimeter.

M - Molecular Weight of pentane - 72.15

LEL- of pentane in air - 1.4% by volume.

T - Room temperature - 23° C.

P - Barometric pressure - 739 mm. Hg.

Solution: C = 100% of the L.E.L. of pentane = 1.4

V_c = 30 Liters = 30,000 cubic centimeters (cc)

Substituting in the above formula:

$$V_1 = \frac{(1.4 \times 30,000 \times 72.15)}{(0.6262 \times 2,241,200)} \times \left(\frac{273}{273 + 23} \right) \times \left(\frac{739}{760} \right)$$

or V_1 = 1.93 cc. This quantity is placed in each container.

75% of L.E.L. Mixture would require 75% of 1.93 (1.35cc), 60% of a L.E.L. mixture would require 60% of 1.93 (1.16 cc), etc.

The necessity for re-evaluating this formula for different conditions of temperature and barometric pressure can be determined by substituting the maximum and minimum values of these variables encountered in the laboratory. It may be possible to considerably simplify the computation by deriving a constant for the quantity

$\frac{1}{2,241,200} \times \left(\frac{273}{273 + T} \right) \times \left(\frac{P}{760} \right)$ by substituting average temperature and pressure conditions.

The following substances are suitable for use in calibration work:

<u>Substances</u>	<u>Molecular Weight</u>	<u>Density in grams per cc</u>	<u>L.E.L. % by volume</u>
n-hexane	86.18	0.6594	1.2
n-pentane	72.15	0.6262	1.4
acetone	58.08	0.7908	2.5
cyclohexane	84.16	0.7791	1.3
ethyl acetate	88.11	0.9005	2.2



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Date 6-5-67

Cancel None

A. ENVIRONMENTAL CONTROL OF HEALTH HAZARDS

HEAT STRESS

THE EFFECTS OF HEAT CAN BE LESSENER BY:

1. Cooling the man by blowing air over him, provided the wet-bulb temperature is not above body temperature (98.6° F.). (If the wet-bulb temperature of the air is above body temperature, blowing air over the worker does not cool him; it heats him even more and increases his discomfort). An air movement rate up to 500 fpm may not be objectionable.
2. Lowering the temperature of the workplace.
3. Limiting exposure time by rotating men or "spelling them off" with replacements.
4. Placing the man in a more hospitable environment. (For example, air conditioning in crane cabs, control booths, etc.).
5. Decreasing radiant heat exposure by use of shields between the radiating body and the man. (Aluminum reflects 90 - 95% of radiant heat).
6. Increasing intake of salt, provided there is ample intake of water, and providing this does not violate specific medical instructions.
7. Lowering the humidity, which has the effect of allowing perspiration to evaporate more rapidly. This has a cooling effect.

HEAT STRESS EVALUATION *

It must be emphasized at the outset that if there are medically recognized heat stress cases, there is a problem regardless of results calculated from temperature measurements and work performed; however, the use of a Simplified Effective Temperature (S.E.T.) is a simple means by which an approximate evaluation of heat stress is made.

- * This simplified method of heat stress evaluation is applicable in temperate zones, but may not be applicable in extremely hot climates.



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Cancels None

A. ENVIRONMENTAL CONTROL OF HEALTH HAZARDS

HEAT STRESS (Continued)

The S.E.T. is calculated according to the following scheme:

<u>Wet Bulb Temp.</u>	<u>Simplified Effective Temperature</u>
70 - 75° F.	0.7 tw + 0.3 tg
76 - 80° F.	0.8 tw + 0.2 tg
Above 80° F.	0.9 tw + 0.1 tg

where tw = wet bulb temperature in °F.
tg = black globe temperature in °F.

Note: The use of this scheme assumes air movement of at least 50 linear feet per minute.

EXAMPLE

Problem: The wet bulb temperature is 79° F. and the black globe temperature is 131° F. What is the simplified effective temperature?

Solution: Since the wet bulb temperature is 79° F. (between 76° F. and 80° F.), the correct formula (see above) is:
0.8 tw + 0.2 tg.

$$\begin{aligned} 0.8 \text{ tw} &= 0.8 \times 79 = 63.2 \\ 0.2 \text{ tg} &= 0.2 \times 131 = 26.2 \\ \text{Total} &89.4 \end{aligned}$$

The S.E.T. is 89.4°

~~See pages 6.2.A.14 and 6.2.A.15 for a list of the equipment needed and instructions for making measurements.~~

Application of the S.E.T. is as follows:

The upper limit for light work is	90°
The upper limit for moderate work is	88°
The upper limit for heavy work is	80°



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Cancels None

A. ENVIRONMENTAL CONTROL OF HEALTH HAZARDS

HEAT STRESS (Continued)

Following are examples of light, moderate and heavy work which may be used as a guide in evaluation of the operation in question:

1. Light Work

- a. In-plant tractor operation
- b. Green tire inspection
- c. Desk work such as typing
- d. Elevator operation
- e. Reactor operator
- f. Sitting, with moderate arm and leg movements

2. Moderate Work

- a. Banbury operator
- b. Hand welding and cutting
- c. Cement mixer in adhesives operations
- d. Splicer in tire plant
- e. Building passenger
- f. Standing, light work bench

3. Heavy Work

1. Intermittent heavy lifting, pushing or pulling
2. Pick and shovel work
3. Loading tires into boxcar or trailer

THE BEST GAUGE IS THE MAN HIMSELF: IF THERE ARE MEDICALLY RECOGNIZED HEAT STRESS CASES, THERE IS A HEAT STRESS PROBLEM.

Determination SIMPLIFIED EFFECTIVE TEMPERATURE EQUIPMENT AND ITS USE

1. Equipment

a. Wet bulb thermometer

The wet bulb of a psychrometer such as Matheson Scientific Inc. Catalog No. 31792-10 (or equivalent) may be used.

b. Black globe thermometer. (See sketch on page *insert proper page* 6.2.A.15).

- (1) Thermometer graduated to about 150° F.
- (2) Copper toilet tank float painted flat black.



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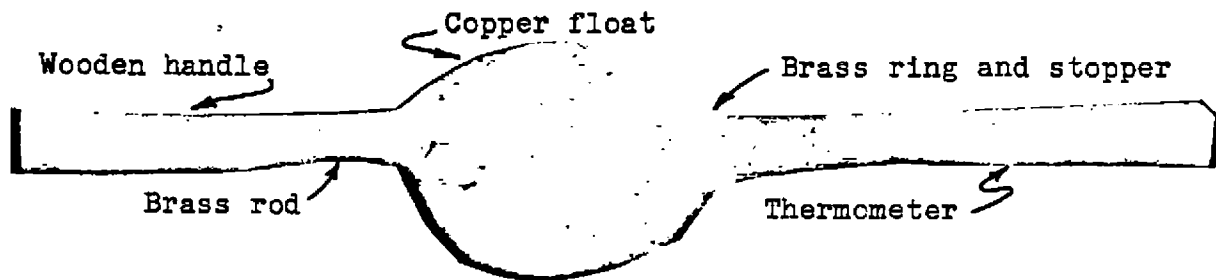
Date 6-5-67
Cancels None

A. ENVIRONMENTAL CONTROL OF HEALTH HAZARDS

HEAT STRESS(Continued)

- (3) Handle for copper float. Use the brass rod which is ordinarily a part of a toilet tank float assembly, and which screws into the float. A wooden handle may be fitted onto the other end of the brass rod.
- (4) A brass ring approximately 11/16" I.D. is soldered into the end of copper float opposite the brass rod after a hole to accommodate the ring has been made.
- (5) A #2 rubber stopper (or cork) with one hole in its center into which the thermometer is inserted. Adjust position of thermometer so that when the stopper is inserted into the brass ring the thermometer bulb is centered in the copper float.

SKETCH - (Not to scale)



- c. A velometer or anemometer to check air movement.

2. Use of equipment

- a. Hold wet bulb thermometer in the atmosphere to be tested. Follow the instructions for the instrument which is used. Make certain that the wick on the thermometer bulb is wet. It dries out rapidly when the air temperature is high, particularly when hot objects such as tire molds are radiating heat to the surrounding atmosphere.
- b. Hold black globe thermometer in atmosphere to be tested. 20 to 40 minutes may be required for it to reach equilibrium.
- c. Velometer or anemometer. Follow manufacturer's instructions.



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Part 2 HEALTH HAZARDS AND THEIR CONTROL

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Cancels None

A. ENVIRONMENTAL CONTROL OF HEALTH HAZARDS

LABELING OF HAZARDOUS SUBSTANCES

General *authoritative*
Manufacturers often use precautionary labels on containers of hazardous industrial materials. The most ~~common~~ guide used is Manual L-1, "Guide to Precautionary Labeling of Hazardous Chemicals," published by Manufacturing Chemists Association, Inc. (MCA).

An understanding of the MCA system is an aid in determining the degree of hazard. An explanation of it follows.

The following information may be included on the label:

1. Name of Product

usually stated.
The chemical name of the substance is ~~often given~~. If the complete chemical name is not shown, the label will probably state the type of chemical, for example, "Corrosive acid", or "lead compound".

2. The Signal Word

The signal words are:

- A. DANGER!
- B. WARNING!
- C. CAUTION!

DANGER is the strongest of the three words and is used for products presenting the most serious hazards. CAUTION is recommended for compounds presenting the least serious hazards. WARNING is intermediate between danger and caution.

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A. ENVIRONMENTAL CONTROL OF HEALTH HAZARDS

LABELING OF HAZARDOUS SUBSTANCES (continued)

3. Statement of Hazards

This statement will give notice of the hazards that are present in connection with the customary or reasonably anticipated handling or use of the product. Examples are:

CAUSES BURNS

VAPOR EXTREMELY HAZARDOUS

Many chemical products will present more than one type of hazard; the most serious hazard will usually be stated first.

4. Precautionary Measures

These instructions are intended to supplement the statement of hazards by setting forth briefly measures to be taken to avoid injury or damage from the stated hazards. Examples are:

KEEP AWAY FROM HEAT, SPARKS, AND OPEN FLAME

AVOID BREATHING DUST

Precautionary Measures may be included for hazards not considered of sufficient importance to require mention in the statement of hazards.

Statements such as "Do not take internally" deserve special attention. They are seldom necessary where the precautionary measure to be followed is obvious. For example, when the statement of hazards contains the words "May be fatal if swallowed" or when the word "POISON" is used, this is considered sufficient.



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A. ENVIRONMENTAL CONTROL OF HEALTH HAZARDS

LABELING OF HAZARDOUS SUBSTANCES (continued)

5. Instructions in Case of Contact or Exposure

Although the primary purpose of labeling is to prevent injury or damage, instructions in case of contact or exposure may be included in instances where the results of contact or exposure are severe and immediate treatment is highly desirable. These instructions are ordinarily limited to recognized first aid procedures. Instructions for medical treatment are usually omitted except when specifically required by law or indicated by special circumstances. Because of the serious and lasting effects which may result from eye injuries, a recommendation to get medical attention usually accompanies any specific instructions directed to treatment of the eyes *Highly toxic and/or*

The word "POISON" was used above. This word accompanied by the skull and crossbones on a label is limited to cases where the product is especially ~~dangerous~~ or where its use is prescribed by law. ~~Its use is in addition to other label warnings. When used, this legend does not~~ *should not take the place of the signal word.* Care should always be exercised in handling and storing containers of hazardous materials and in removing the contents. Instructions are sometimes given in combination with the precautionary labels but are sometimes on a separate label.

A hazardous substance is defined as any substance or mixture of substances which is:

1. ~~Toxic~~ *Toxic*
2. ~~Highly Toxic~~ *Highly Toxic*
3. ~~Corrosive~~ *Corrosive*
4. ~~An irritant~~ *An irritant*
5. ~~A strong sensitizer~~ *A strong sensitizer*
6. ~~A strong oxidizer~~ *A strong oxidizer*
7. ~~Flammable~~ *Flammable*
8. ~~A combustible, flammable or extremely flammable liquid~~ *A combustible, flammable or extremely flammable liquid*
9. ~~Dangerously reactive~~ *Dangerously reactive*

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A. ENVIRONMENTAL CONTROL OF HEALTH HAZARDS

LABELING OF HAZARDOUS SUBSTANCES (continued)

9 Pressure generating, ~~PROVIDED~~ PROVIDED

9. ~~Or which generates pressure through decomposition, heat, or other means if such substance or mixture of substances may cause substantial injury or illness during or as a direct result of any customary or reasonably anticipated handling or use.~~

Some of the

The terms listed above are further defined.

1. ~~A toxic substance is one which has the inherent capacity to produce personal injury or illness to man through ingestion, inhalation, or absorption through any body surface.~~

2. A corrosive substance is one which in contact with living tissue causes destruction of the tissue by chemical action.

3. An irritant is a substance which on immediate, prolonged, or repeated contact with normal living tissue will induce a local inflammatory reaction.

4. A sensitizer is a substance which will cause on normal living tissue a hyper-sensitivity which becomes evident on reapplication of the same substance.

5. ~~Flammable substances fall into three categories:~~ ^{five} within any of the following categories:

- An extremely flammable liquid is one which gives off flammable vapors at or below a temperature of 20°F as determined by open cup testing.
- A flammable liquid is one which gives off flammable vapors above 20°F to and including 80°F as determined by open cup testing.
- A combustible liquid is one which has a flash point above 80°F to and including 150°F as determined by open cup testing.
- (Copy "Flammable Solid", page 11, MCA Manual)
- (Copy "Flammable gas" --- from page 11, MCA Manual)

6. Strong Oxidizer (Copy from page 13 in MCA Manual)
7. Reactive A substance which will cause rapid chemical changes if it contacts certain other substances, especially, heat, fire, or a violent reaction.

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dated 7-16-68

A. ENVIRONMENTAL CONTROL OF HEALTH HAZARDS

LABELING OF HAZARDOUS SUBSTANCES (continued)

~~Precautionary Measures ^{may be} are sometimes included for hazards not considered of sufficient importance to be mentioned in the Statement of hazards. For example, a liquid with a flash point above 80°F may not be referred to in the statement of hazards, but under precautionary measures there may be a statement such as "Keep away from open flame."~~

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Cancels None

A. ENVIRONMENTAL CONTROL OF HEALTH HAZARDS

NOISE

Exposure to excessive noise for prolonged periods of time causes permanent hearing loss.

A Threshold Limit Value (TLV) was established by the American Conference of Governmental Industrial Hygienists in May, 1969. Essentially the same TLV has been adopted as part of the U. S. Department of Labor Safety and Health Standards promulgated under the authority of the Walsh-Healey Act. Noise is covered in Section 50-204-10, Subpart B, Part 50-204 - Safety and Health Standards for Federal Supply Contracts.

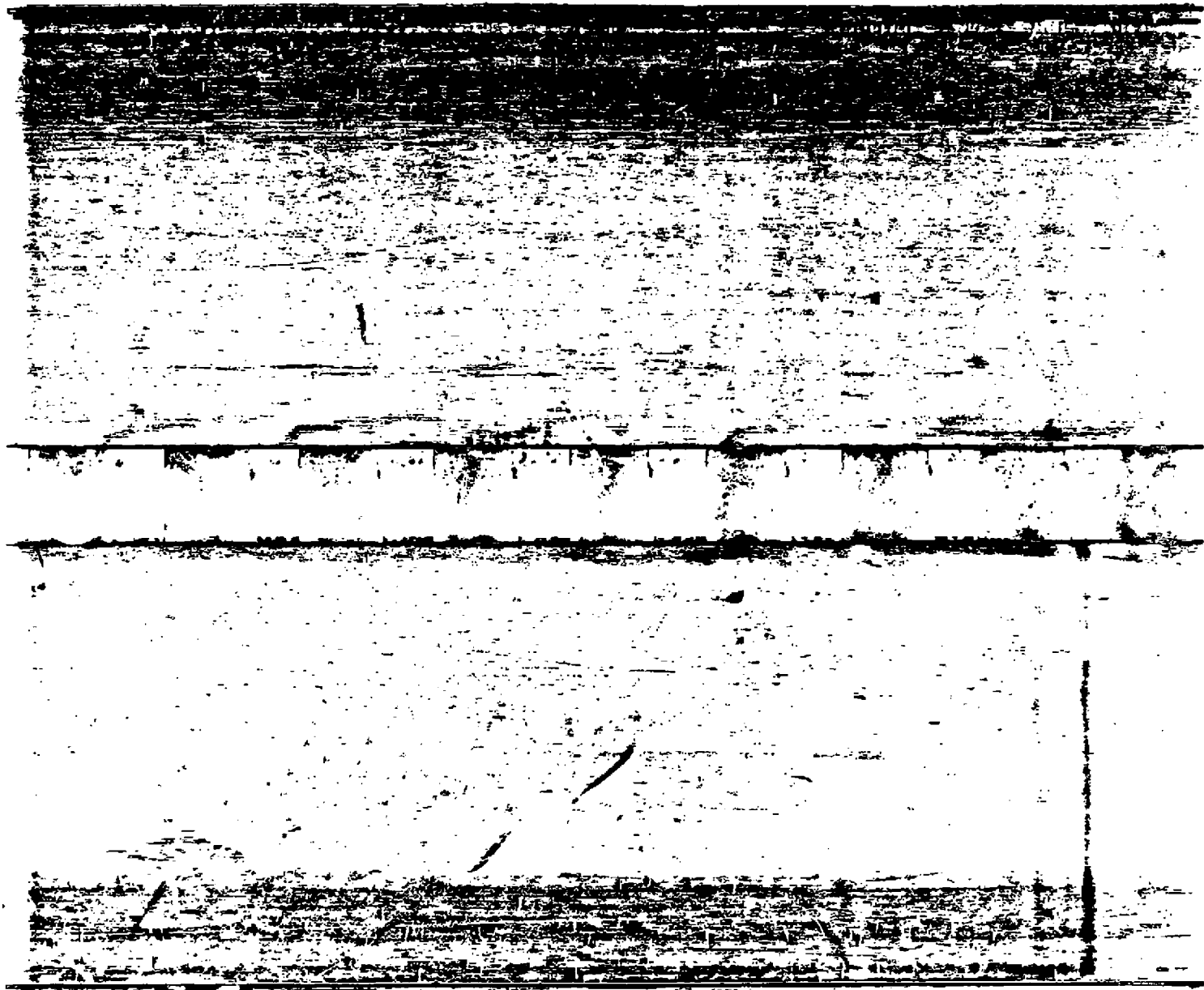
The TLV has been adopted by Firestone as the guide to determine hazardous exposure, and is as follows:

TABLE I

PERMISSIBLE NOISE EXPOSURES

<u>Duration of Daily Exposure - Hours</u>	<u>Sound Level A Weighted Network (dBA)</u>
8	90
6	92
4	95
3	97
2	100
1-1/2	102
1	105
3/4	107
1/2	110
3/8	112
1/4	115

(No exposure allowed at any level over 115 dBA.)



SUBJECT TO DISCLOSURE RESTRICTION

40730



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A. ENVIRONMENTAL CONTROL OF HEALTH HAZARDS

are required for checking audiometer calibration, and
NOISE (continued)

Octave band measurements are no longer needed for determination of hearing loss hazard, but may be useful for determination of:

1. The exact source of certain frequencies.
2. Community noise nuisances.
3. Speech and telephone interference.



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Date 5-7-70
Cancels None

A. ENVIRONMENTAL CONTROL OF HEALTH HAZARDS

FIRESTONE TOXICOLOGICAL DATA SHEET

The Firestone Data Sheet for Toxicological and Safe Handling Information was developed as an aid in securing toxicological and safe handling data. A copy is reproduced as Appendix A to this page.

A Data Sheet must be completed by the supplier before a new material is brought in, even a small sample.

The simplest and best procedure is that the plant purchasing department send out the forms for completion.

Blank forms are available from the Home Office Industrial Hygiene Department. Do not order them from Stationery Stores. Completed forms are necessary whether the material is to be used in production, laboratory, research and development, or pilot plant, or as cleaning, janitorial, maintenance, and engineering supplies.

The name of the individual and the plant requesting data must be filled in (first item on form) prior to its submission to the supplier for completion.

Completed Data Sheets must be returned directly to the Home Office Industrial Hygiene Department. (Address is at the bottom of second page.) The reason for this is that in many cases confidential information is involved.

After review of the completed form, the Home Office Industrial Hygiene Department will make a write-up which covers handling precautions, and forward it to the plant Safety Department, except that on RP numbers assigned in Akron, the write-up will be forwarded through General Factory Technical Management.

Some judgment must be used. Following are typical situations in which a Data Sheet is or is not needed.

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A. ENVIRONMENTAL CONTROL OF HEALTH HAZARDS

FIRESTONE TOXICOLOGICAL DATA SHEET (continued)

1. Needed

- a. Chemicals
- b. Mixtures of chemicals
- c. Unusual chemicals on which data are not likely to be available in our standard toxicology references.
- d. Proprietary mixtures
- e. Materials identified only by manufacturer's trademark name or code number.

2. Not Needed

- a. New RP numbers where the proposed use originates in Akron. (Home Office Industrial Hygiene Department will secure one.)
- b. Materials such as steel, machinery, nylon, or other materials which are physiologically inert.

If there is any doubt, have a Data Sheet completed and returned.

S-3341 REV. 5-70

**FIRESTONE DATA SHEET
FOR TOXICOLOGICAL AND SAFE HANDLING INFORMATION**

(Please Complete Applicable Sections on Both Sides)

INFORMATION REQUESTED BY: _____
(Name) (Plant)

1. Product name, chemical name, number, synonym: _____
2. Physiological Properties (Do not use numerical toxicity ratings unless the reference is given):
 - a. Acute oral toxicity: _____
 - b. Local effects upon eyes: _____
 - c. Local effects upon skin: _____
 - d. Acute & chronic inhalation toxicity: _____
 - e. Warning Properties (Odor, irritation to eyes, nose or throat): _____
 - f. Estimated Threshold Limit Value (if not on current list by American Conference of Governmental Industrial Hygienists): _____
3. First Aid Treatment:
 - a. In contact: _____
 - b. Eye contact: _____
 - c. Inhalation: _____
 - d. Antidote in case of swallowing: _____
4. Precautions for Normal Conditions of Use: _____
5. Recommended Protective Equipment: _____
6. Chemical and Physical Properties:
 - a. Specific gravity (water=1) _____
 - b. Vapor density (air=1) _____
 - c. Vapor pressure mm Hg at 25°C _____
 - d. pH _____
 - e. Corrosive action on materials such as: aluminum; magnesium; plastics; rubber; lacquers; enamels; fabrics; etc.: _____
 - f. Does the material decompose violently when exposed to air? Water? Heat? Strong Oxidizers? _____

g. List percentage composition of ingredients, including impurities.

NOTE: Proper chemical names must be known. Generalizations such as petroleum hydrocarbons, alcohols, ketones, chlorinated hydrocarbons, etc., are not adequate for toxicological evaluation.

Compound	Percent
_____	_____
_____	_____
_____	_____
_____	_____

h. Does the material generate heat through polymerization or condensation? _____

i. Flash point °F: Closed Cup _____ ; Open Cup _____ ; If F.P. changes during evaporation, give data: _____

j. Explosive limits (% vol. air): Lower _____ ; Upper _____

k. Susceptibility to Spontaneous Heating: Yes _____ ; No _____

l. Fire Point °F _____ ; Auto ignition temperature °F _____

m. Vapor density _____

n. What products might be formed in the event of fire or abnormal temperatures? _____

o. Suitable extinguishing agents: _____

7. Procedure in Case of Breakage or Leakage: _____

8. Transportation and Storage Requirements: _____

9. Has this product received acceptance by FDA, or is work in progress to obtain such acceptance? _____

Give regulations where listed, _____

10. IF THIS PRODUCT IS TO BE CONSIDERED, ITS LABELS MUST BE ATTACHED HERETO.

11. Information Furnished By: _____ Title: _____

Company: _____

Address: _____

Date: _____

N Information in regard to this material's composition will be treated as confidential and used only for the purpose of protecting the health and safety of Firestone employees and the safeguarding of its property.

Mail completed form to: INDUSTRIAL HYGIENE DEPT., MEDICAL DIVISION
THE FIRESTONE TIRE & RUBBER COMPANY
1200 FIRESTONE PARKWAY
AKRON, OHIO 44317



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B. PERSONAL PROTECTION EQUIPMENT

RESPIRATORY PROTECTIVE EQUIPMENT

While engineering controls should ordinarily be the first line of attack in preventing excessive exposure to air contaminants, personal respiratory protection is useful for short periods of time or as an emergency measure until engineering controls can be installed.

The U. S. Bureau of Mines has had a program of testing and approving certain types of these devices for many years. Only approved equipment shall be used, providing the type in question has been approved.

U. S. BUREAU
of MINES

The effective use of respirators requires a planned program with responsibility specifically assigned to an adequately trained, experienced person. The following are essential parts of the program:

1. Selection -> REFER TO "RESPIRATORS APPROVED BY BUREAU OF MINES", COPY OF WHICH WAS FORWARDED TO ALL PLANTS ON

Select a device that will protect adequately against the air contaminant present. There are several vital points which must always be considered in the selection of equipment.

a. Dust respirators are of no value when the air contaminant is other than dust, for example, when it is a gas or vapor.

b. Chemical cartridge respirators and gas masks must not be used inside tanks and other enclosures where there may be high concentrations of toxic gases.

c. Chemical cartridge respirators are non-emergency devices and must never be used in immediately dangerous atmospheres, immediately

d. Gas masks and chemical cartridge respirators are of no value where the atmosphere may be deficient in oxygen.

e. Gas masks with the proper canister are satisfactory for protection against low concentrations of many highly toxic chemicals, but where chemical cartridge respirators are unsatisfactory. (Example: acrolein, aniline, arsine, carbon monoxide, phosphorous trichloride, ketene and many others).

f. Supplied air respiratory protective equipment will be used where there may be an oxygen deficiency or where high concentrations of toxic gases preclude the use of chemical cartridge respirators or gas masks.

g. Consult with the Industrial Hygiene Department in Akron prior to the installation or use of respirators fed by compressed air from factory air lines.



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B. PERSONAL PROTECTION EQUIPMENT

Consult with the Industrial Hygiene Department in Akron if any doubt exists.

2. Instruction + + + ->

Instruct the wearer in the need for using the device and the means by which protection is afforded. Demonstrate and have the wearer practice obtaining proper facepiece fit and adjusting for comfort and effective protection. *Follow the manufacturer's directions.*

3. Supervision + + + ->

Supervise to assure that the proper device is being used for each exposure condition and that the device is complete and in proper operating condition. Supplemental safety precautions such as a life line and standby rescue personnel should be provided where needed.

4. Cleaning + + + ->

Routinely used respirators should be cleaned after each use. Cleaning is best accomplished at a central point at the end of the shift. When a respirator is used by only one individual, a practical method of cleaning is as follows:

- 1a. Remove filter (or cartridge).
- 2b. Wash with detergent or soap in warm water (120° F.).
3. Rinse thoroughly in clean warm water.
- 4d. Air dry in a clean area.
- 5e. Inspect valves, headstraps and other parts; replace defective parts.
- 6f. Insert filter (or cartridge).

There is no reason to require special sterilizing when a respirator is used by only one individual. When the same respirators are used by different individuals, a good public health policy is to disinfect them before they are reissued. The compounds generally considered reliable for disinfecting are:



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B. PERSONAL PROTECTION EQUIPMENT

- a. A hypochlorite solution (50 parts per million [ppm] of chlorine; immersion time, 2 min.), or
- b. An alcoholic solution of iodine (50 ppm iodine; 2 min. immersion).

5. Inspection and Maintenance + + +

Devices used routinely can be inspected during cleaning, and worn or deteriorated parts replaced with parts specifically designed for the particular respirator. Filters or cartridges may be changed after each use or according to schedule.

Emergency equipment shall be thoroughly inspected at scheduled periodic intervals to assure first-class condition at all times.

6. Storage + + +

Store equipment in dustproof containers (original cartons, cases, or plastic bags are suitable) away from sunlight, heat extreme cold, and excessive moisture.

If there are questions about respiratory protection, contact the Industrial Hygiene Department in Akron.



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B. PERSONAL PROTECTION EQUIPMENT

1. GENERAL SELF-CONTAINED BREATHING EQUIPMENT

Self-contained breathing equipment is useful where there may be insufficient oxygen or high air concentrations of toxic materials.

1. Oxygen deficiency

a. Enclosures may be oxygen deficient because of:

- (1) Oxygen consumption by chemical or biological
a reaction with residues in the enclosure. (Even an empty steel tank may lack sufficient oxygen to support life because of rusting).

- b (2) ^{WATER} Absorption of oxygen ^{from the air over} the water in a well.

- c (3) Oxidation during the curing and drying of paint.

- d (4) Partial or complete displacement of air by gases or vapors of volatile materials.

2. Enclosures such as tanks, vats, silos, pits and sewers may be oxygen deficient and immediately hazardous to life even if toxic gases are absent. - The warning properties of an atmosphere deficient in oxygen are completely inadequate. The average individual fails to recognize the danger until he is too weak to save himself, especially where the return to good air involves climbing stairs or a ladder. One of the earliest effects of an oxygen deficient atmosphere is an increased rate of breathing. The increased breathing rate depletes the oxygen normally available in the lungs by ventilation, so that even less is available for absorption into the blood.

3. The normal oxygen content of air is about 21%. Increased breathing and pulse rates occur when it is reduced to about 16%. Disturbed respiration, abnormal fatigue upon exertion, inability to move freely, and nausea and vomiting occur when it is reduced to 14%. More serious symptoms occur when the oxygen content of air is 10%. The affected individual may collapse, and although aware of circumstances, be unable to move or cry out. Below 6%, respiration stops and heart action ceases in a few minutes. When the oxygen in the lung atmosphere falls below 10% the arterial blood supply to the brain becomes insufficiently oxygenated to maintain consciousness. This occurs in seconds, not minutes. Respiratory failure and cessation of heart action soon follow unless the subject is returned to respirable air. Certain areas



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B. PERSONAL PROTECTION EQUIPMENT

SELF-CONTAINED BREATHING EQUIPMENT (Continued)

of the brain are damaged if the oxygen supply is interrupted for more than five minutes, even though breathing may not have stopped.

4. In many cases when an individual has collapsed in an enclosure, the natural course of events is for a fellow workman to enter, without respiratory protection, in a rescue effort. Often two or more workmen enter, compounding the initial tragedy.

14 + 2. Potential Uses

Situations where self-contained breathing equipment may be needed include:

- Fire fighting.
- Tank cleaning operations.
- Cleanup of large leaks or spills of solvents or other volatile chemicals, especially in enclosed areas.
- Entry into underground carbon black handling areas.
- Entry into sewers, wells and silos.

3. Chemical cartridge respirators and gas masks

Chemical cartridge respirators and gas masks are not suitable for protection against high concentrations of toxic gases. Chemical cartridge respirators are U. S. Bureau of Mines approved only for gases and vapors up to 0.1% by volume in air (1000 ppm). Gas masks are approved only for concentrations up to 2% (except 1% for chlorine and 3% for ammonia.) Neither protects against insufficient oxygen.

Local safety equipment suppliers can advise on the type of equipment most suitable for specific applications. Such equipment shall be U. S. Bureau of Mines approved. If assistance is needed, contact the Home Office Industrial Hygiene Department.



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Chemical IMPORTANT PHYSICAL PROPERTIES AND PRINCIPAL USES OF CERTAIN TOXIC SUBSTANCES WITH CHIEF DIAGNOSTIC SIGNS OF INJURY OR OTHER DISABILITY

Toxic Substance	Ordinary State	Fire Hazard	Principal Uses & Processes Producing Potential Hazard	Mode of Entrance Into Body	Diagnostic Signs and Symptoms
Acetaldehyde	Liquid	Dangerous	Organic synthesis; silvering mirrors; dye mfg.; disinfectants; rubber mfg.; explosives	In the form of vapor thru respiratory organs and mucous membranes	Irritation of mucous membranes of eyes and respiratory tract; dyspnea and cough; acceleration of heart; profuse night sweats.
Acetanilide (Also see Aniline)	White leaf crystals	None	Medicine; addition to cellulose ester "dopes" and lacquers; dye, paint and rubber mfg.	Thru respiratory and digestive organs	Cyanosis or blueness of lips and finger tips; mental confusion, dizziness.
Acetone	Liquid	Explosive	Organic synthesis; solvent; varnishes; lacquers; mfg. of celluloid; mfg. of chloroform; airplane-dope	Direct action on skin; thru respiratory organs	Irritation of skin and mucous membranes of eyes and respiratory tract.
Acetylene	Gas	Explosive	Organic synthesis; illumination; oxy-acetylene welding and cutting of metals	Thru respiratory organs	Headache, nausea, general malaise, feeling of suffocation, vertigo.
Acridine	Colorless crystalline needles	None	Dye mfg.; acridine workers	Exerts effect in any state of aggregation on skin and mucous membranes	Irritation of skin and mucous membranes of eyes and respiratory tract; violent sneezing.
Aerobin	Liquid	Slight	Organic synthesis; mfg. of military poison gas; refrigerants; soap and varnish mfg.	As vapor thru respiratory organs and mucous membranes; direct action on skin	Excessive irritation of skin and mucous membranes of eyes and respiratory tract; bronchial catarrh dyspnea.
Aluminum	Metal; dust	Explosive	Metal alloys; paint		Not generally regarded as an industrial poison.
Amino Compounds (Also see Aniline)	Crystals; powder; liquid	None	Organic synthesis; dye mfg. photographic developers; paints; disinfectants; varnishes; printing	Respiratory organs, digestive tract and absorption thru skin	Pallor followed by cyanosis, especially of lips and finger tips, weakness, somnolence, irritability, mental confusion, headache and vertigo, muscular tremor and convulsions, eczematous eruptions, weak pulse, brownish discoloration of blood and urine, disorders of the bladder, (tumors, etc.).
Ammonia	Gas	Explosive	Organic preparations; refrigeration; brazing; electro-plating; galvanizing; dye and color mfg.; sugar refining	As a gas thru respiratory organs	Irritation of respiratory passages, cough and dyspnea, pulmonary edema, bronchitis, severe irritation of eyes, conjunctivitis, caustic action on skin.
Amyl Acetate	Liquid	Explosive	Preparation of flavoring compounds; brazing liquids; metallic paints; perfumery; soap	As vapor thru respiratory organs	Irritation of mucous membranes of eyes, nose, throat and bronchial tubes; headache and vertigo, drowsiness, oppression in chest, cough, nausea.
Amyl Alcohol	Liquid	Dangerous	Organic synthesis; brewing; paint and rubber mfg.; lacquers, varnishes	As vapor thru respiratory organs	Irritation of eyes and respiratory tract, headache and vertigo, dyspnea and cough, nausea, vomiting, diarrhea.
Aniline	Oil; Liquid	None	Organic synthesis; dye mfg.; rubber industry; paint and varnish mfg.; disinfectants; explosives	Absorption thru skin. Thru respiratory and digestive organs	Acute:—Muscular weakness, vertigo, pallor, cyanosis of lips, slow pulse, fainting, possible death. Chronic:—Nervous symptoms, disturbances of sensibility and equilibrium, nausea, vomiting, diarrhea, eczema.
Antimony and its Compounds	Crystals; powder; metal	Dangerous	Metallurgy; paints; mordant; storage batteries; electrolyzers; smelting; lead and zinc mining and smelting	Direct action on skin. As dust or vapor thru respiratory organs; digestive tract and mucous membranes	Inflammation of mucous membranes of nose, mouth and throat. Intestinal disorders. Irritation and eczematous eruptions of the skin. Metal fume fever (usually associated with lead and arsenic in most of its industrial uses).
Arsenic	Crystals	None	Medicine; arsenic salts; metallurgy; insecticides; lead, copper and zinc mining and smelting	As gas and dust thru respiratory organs; mucous membranes and digestive organs	Toxic effects on digestive system, liver, kidneys, circulatory system and heart. Loss of hair and nails. Perforation of septum. Local ulceration. Metal fume fever.

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Toxic Substances	Ordinary State	Fire Hazard	Principal Uses & Processes Producing Potential Hazard	Mode of Entrance Into Body	Diagnostic Signs and Symptoms
Arsenic Compounds (Except Arsenite)	Crystals; powder	Dangerous	Analytical chemistry; paint pigments; medicine; depilatory agent; leather industry; shipper, lead and zinc mining and smelting; dye and varnish mfg.; paints, lacquers	See Arsenic	Acute poisoning:—Constriction of the esophagus, pains in stomach, vomiting, diarrhea, bluish skin, headache, faintness, loss of consciousness, convulsions, death. Chronic poisoning: persistent headache, sleeplessness, gastric disturbances, vomiting, diarrhea, catarrh of the mucous membranes, skin diseases, loss of hair and nails, chilliness, weakness of the muscles.
Arsine (Arsenized-hydrogen)	Gas	Slightly	Organic synthesis; military poison gas	As gas thru respiratory organs	Severe headache, nausea, vomiting, hemoglobinuria, gastric disorders, shivering and chills, jaundice
Barium Compounds	Metal; crystalline powder	Explosive	Paint mfg.; sugar refining; fire works mfg.; dye mfg.; insecticides	Direct action on skin; ingestion of soluble salts	Dermatitis, whitening and loss of hair, paralysis, acceleration of the heart, cyanosis of the skin, gastric pain and vomiting.
Benzene (Naphtha-gasoline)	Liquid	Explosive	Solvent; motor fuel; dry cleaning; paint; varnish, soap mfg.; rubber industry	Vapor, thru respiratory organs and at times by absorption thru skin	Headache, vertigo, nausea, vomiting, cough, irregular respiration, weakness of heart, muscular twitching, drowsiness, "Naphtha jag," dermatitis.
Benzene (Benzol)	Liquid	Explosive	Solvent; motor fuel; paint and varnish removers; organic preparations; airplane industry; dye and varnish mfg.; rubber industry; welders; dry cleaning	Vapor, thru respiratory organs; reabsorption thru skin	Headache and vertigo, gastrointestinal disturbances, hemorrhages, purpura, injury to blood-forming organs with marked but varied changes in the blood picture—slight polycythemia followed by leukopenia, erythropenia, anemia, and so forth; injury to blood vessels, heart, liver, kidneys, and nervous system; marked susceptibility to infection, local irritation, (bronchitis, conjunctivitis, gingivitis, and so forth). In acute poisoning: inebriation, staggering gait, twitchings, convulsions, and loss of consciousness. Note:—The effects of toluol and xylol differ from those of benzol particularly as regards their effects on the blood and blood-forming organs. Neither of these compounds produce the changes in the blood characteristic of benzol. It is important to note however that the toluol and xylol used in industry are frequently mixed with benzol.
Beryllium	Metal; powder	None	Metal alloys	Fumes thru respiratory tract	Metal fume fever (see Zinc). Severe lung injury has been reported from the extraction of beryllium, but this is thought to be due to the fluorine compounds used in the process of extraction.
Brass (Zinc)	Metal	None	Metallurgy; organic synthesis; welding; brass foundries	As a dust or fumes, irritating respiratory system and entering alimentary canal	Headache, general malaise, irritation of throat, cough, slight nausea, severe chills with fever, profuse perspiration, muscular pains, exhaustion. Metal fume fever.
Bromine	Liquid	None	Organic synthesis; dyes; bromides; military poison gas; explosives	As a vapor thru respiratory system	Irritation of air passages, bronchitis, conjunctivitis, skin eruptions, brownish discoloration of skin and mucous membranes.
2-Butanone (methyl ethyl ketone)	Liquid	Slight	Pyroxylin mfg.; artificial leather mfg.; paint removers; cosmetic mfg.	Absorption by skin, respiratory tract and mucous membranes	Irritation of eyes and nose (Warning odor.)
n-Butyl Acetate	Liquid	Dangerous	Lacquer mfg.; straw hat mfg.; leather mfg.; plastics; safety glass	Mucous membranes; fumes and vapors thru respiratory tract	(See Amyl Acetate.)
Butyl Alcohol (n-Butanol)	Liquid	Dangerous	Mfg. fruit essences; organic synthesis; artificial leather; perfumes; dye mfg.; varnishes	Direct action on skin, as a vapor thru respiratory system	No case of industrial poisoning has been reported, but it has been considered a contributing cause in a number of cases of poisoning. Animal experimentation showed marked dermatitis, early liver degeneration, a definite decrease in red blood cells, with an absolute and relative lymphocytosis.

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Toxic Substance	Ordinary State	Fire Hazard	Principal Uses & Processes Producing Potential Hazard	Mode of Entrance Into Body	Diagnostic Signs and Symptoms
Cadmium	Metal	None	Alloys; cadmium salts; dental amalgam; electroplating; storage batteries; lead and zinc smelters	Fumes thru respiratory tract	Loss of appetite, weakness, nausea, vomiting, rapid pulse, fatty degeneration of liver, inflammation of kidneys, inflammation of lungs, cough, soreness of chest. Metal fume fever.
Calcium Cyanamide	Crystals	None	Fertilizers; nitrogen products; farming	Direct action on skin; as a dust thru the respiratory organs, digestive tract, and visible mucous membranes	Severe irritation of nose, throat, eyes, and skin. Conjunctivitis, tonsillitis, laryngitis, bronchitis, dermatitis.
Carbon Dioxide	Gas	None	Aerating water, wine, beer, etc.; mfg. of soft drinks; fire extinguisher; refrigerant; chemical reagents; mining	In form of gas by inhalation	Large quantities cause sudden death by suffocation. Smaller quantities—vertigo, disturbances of respiration, ringing in ears, headache, dyspnea, drowsiness, muscular weakness.
Carbon Disulfide	Liquid	Explosive	Solvent; varnishes; preservative; insecticides; mfg. of carbon tetrachloride; enameling	In form of vapor thru respiration. Absorption thru skin	Headache, vertigo, weakness, psychical effects, disturbances of sensation, digestive disturbances, polyneuritis, irritation of skin.
Carbon Monoxide	Gas	Explosive	Not an article of commerce—caused by incomplete combustion	As a gas thru respiratory system	Acute—Slow pulse, vertigo, headache, nausea, redness and suffusion of skin, dyspnea, fever, marked leukocytosis, coma and death. Chronic—Headache, nausea, vomiting, anemia, palpitation, insomnia, failure of memory.
Carbon Tetrachloride	Liquid	None	Solvent; fire extinguishers; cleaning compounds; airplane dope; dye, paint and lacquer industries	As vapor thru respiratory organs	Irritation of nose, throat and eyes. Nausea, cough, headache, marked excitement, vomiting, vertigo, mental dullness, confusion, injury to liver, jaundice, nephritis, dermatitis, narcosis.
Cellosolve 2-ethoxyethanol	Liquid	Slight	Lacquer mfg.; paint mfg.; solvent for nitrocellulose	Mucous membranes; vapor thru respiratory tract	U. S. Bureau of Mines found that men exposed to 0.6% for a few seconds reported the atmosphere to be irritating to the eyes and have a very disagreeable odor. However, actual examinations of workers in lacquer and paint manufacture by the British Factory Dept. in 1934 revealed very little evidence of any injury to health from the use of cellosolve.
Chloride of Lime	Powder	Explosive	Textile bleaching; organic synthesis; disinfectant; deodorizer; dye mfg.	As a gas thru inhalation; as vapor and dust irritating eyes, lungs and skin	Bronchitis, dyspnea, asthma, conjunctivitis, eczema ulcers of the skin.
Chlorinated Olefins	Solids	None	Electrical equipment; lacquer mfg.; paint mfg.; rayon mfg.; wax makers	Direct action on skin; vapors thru respiratory tract	Acneiform skin eruptions, jaundice, and atrophy of liver. (See specific hydrocarbon such as carbon tetrachloride, etc.)
Chlorinated Hydrocarbons					
Chlorinated Naphthalenes	Solids	None	Degreasing; paint mfg.; lacquer mfg.; wax makers; electrical equipment mfg.	Direct action on skin; vapor thru respiratory tract	Acneiform skin eruptions, jaundice and atrophy of liver.
Chlorine	Gas; liquid	Explosive	Organic synthesis; textile bleaching; water purification; military poison gas; chlorination	As a gas thru respiratory system	Acute—Large quantities cause cardiac paralysis, smaller quantities cause burning and stinging of the skin with formation of blisters, papules; cough, dyspnea, bronchitis, spasm of the glottis; perspiration; feeble pulse. Chronic—Gastritis, anemia, nasal and bronchial catarrh, furunculosis, decayed teeth.
Chlorobenzene (Monochlorobenzene)	Colorless liquid	Slight	Solvent for cellulose acetate, resins, oils, fats, lacquers; and as a dry-leaving compound	Vapors thru respiratory tract	Acute—Severe somnolence to loss of consciousness with cyanosis. Blood changes described as similar to nitrobenzol derivatives. Chronic—Headache, giddiness. (See Nitrobenzol.)
Emerald-nitrobenzol					

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PHYSICAL PROPERTIES—Continued

Toxic Substance	Ordinary State	Fire Hazard	Principal Uses & Processes Producing Potential Hazard	Mode of Entrance Into Body	Diagnostic Signs and Symptoms
Chloroform (Trichloromethane)	Liquid	None	Solvent for fats, oils, rubber, waxes and resins; artificial silk mfg.	Vapor thru respiratory tract	Feeling of warmth, irritation of nose, throat and skin, loss of reflexes, shallow respiration, unconsciousness, paralysis, cardiac and respiratory failure.
Chloroform					(See Nitrobenzol.)
Chloroprene (2-chloropentadiene)	Liquid	None	Synthetic rubber	Direct action on skin; vapor thru respiratory tract	Narcotic properties but is mainly characterized by its injurious effect on the liver and toxic effect on the kidneys and circulation. Chloroprene vapors mixed with air cause a primary irritation of the respiratory tract.
Chromium compounds	Metal; crystals	Dangerous	For dyeing; metallurgy; electroplating; chromium salts; printing; tanning	As dust and fumes irritating respiratory mucous membranes and skin	Bronchitis, bronchopneumonia, otitis, conjunctivitis, gastritis, anemia, nephritis, eczema, ulcers of the skin and mucous membranes, ulceration and perforation of the nasal septum.
Cobalt	Metal	None	Glass mfg.; steel alloy makers; pottery mfg.	Vapor thru respiratory tract	A case of poisoning with severe damage to the liver and kidneys was reported from a French tile factory. Animal experiments reveal polycythemia. Metal fume fever (see Zinc) has been reported.
Copper	Metal	None	Metallurgy; electrical equipment; chemical apparatus; copper salts; alloys; coinage	As dust from filings, irritating the respiratory mucous membranes; and thru the alimentary canal	Bronchitis, vomiting, gastritis. (See Zinc.)
Cresol (Cresylic Acid)	Liquid	Dangerous	Wood preservative; disinfectants; synthetic resins; explosives; insecticides	As a vapor thru the respiratory organs and visible mucous membranes. Direct action on skin	Toxic effects resemble those of phenol. The chief symptoms are irritation and erosion of skin and mucous membranes, and nephritis.
Cyanogen and compounds	Gas; crystals	Dangerous (Gas)	Extraction of gold and silver from ores; photography; dyeing; printing; electroplating; organic synthesis; military poison gas; insecticide; steel mfg.	As gas or dust thru respiratory system; as liquid or solid form thru the skin	Acute:—Exposure to large amounts of hydrogen cyanide causes death from asphyxia almost immediately. Exposure to lesser amounts causes irritation of eyes and mucous membranes, headache, dizziness, nausea, vomiting, diarrhea, shortness of breath; palpitation of the heart; trembling, muscle cramps, shallow breathing, convulsions, unconsciousness. Hydrogen cyanide and cyanide solutions also cause skin eruptions. Chronic:—Exposure to small amounts of cyanide compounds over a long period of time is reported to cause loss of appetite, weakness, nausea, muscle cramps, unsteady gait, paralysis of arms and legs, psychosis.
Dichloroethylene	Liquid	Slight	Varnishes; rayon mfg.; dry cleaning; perfume mfg.	Mucous membranes; vapor thru respiratory tract	Irritant and narcotic properties. Post mortem findings of men overcome by the vapors of dichloroethylene show an excess of fat in the blood suggesting death from embolism rather than asphyxiation.
Dichloroethyl Ether	Liquid		Textile industry; treating lubricating oils, synthesis of new chemical compounds	Vapor thru respiratory tract, mucous membranes	Irritation of eyes and nose, nausea, marked irritation of respiratory passages and lungs.
Dimethyl Sulphate	Liquid	None	Methylating agent for amines and phenols; perfume mfg.	As a gas thru the respiratory organs; as a fluid, irritating the skin	Burns of skin and mucous membranes, pains in neck and thorax, lacrimation, conjunctivitis, photophobia, edema of cornea, ulcers of bronchial mucosa with aspiration, pneumonia, convulsions, paralysis, coma, death.
Dinitrobenzol					(See Nitrobenzol.)
Dinitrophenol (1-2-4)	Crystalline solid	None	Explosive mfg.; dye mfg.; wood preserving	Thru digestive tract; direct action on skin	Burning throat, sweating, paining, excitement, high fever, patchy yellow skin, and convulsions. After ingestion, evidence of liver and blood damage have been observed. Bilateral cataracts have also occurred as a sequela.

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Toxic Substance	Ordinary State	Fire Hazard	Principal Uses & Processes Producing Potential Hazard	Mode of Entrance Into Body	Diagnostic Signs and Symptoms
Dioxane (Dioxin. Liquid Ion Dioxide)	Liquid	Explosive	Lacquer mfg.; rayon mfg.; dye mfg.; varnish mfg.	Thru mucous membranes; vapor thru respiratory tract; absorption thru skin	Headache, vertigo, drowsiness, irritation of eyes, nose, throat, and lungs; gastric disturbances, injury to liver and kidneys.
Ethyl Benzene	Liquid	Explosive	Anti-knock gasoline; lacquer mfg.; general solvent	Mucous membranes; vapor thru respiratory tract	Causes warning symptoms such as irritation to the eyes and respiratory passages before dangerous concentrations are reached.
Ethyl Bromide	Liquid	Explosive	Refrigeration; anesthetic	Vapor thru respiratory tract; mucous membranes	(See Methyl Chloride).
Ethyl Chloride	Gas	Explosive	Medicine, local anesthetic; organic synthesis; refrigeration; solvent; perfume mfg.	As a gas thru the respiratory organs	Dizziness, drunkenness, apathy, persistent somnolence, loss of power in the legs, uncertain gait, disturbances of vision. (See Methyl Chloride).
Ethylene Dichloride	Liquid	None	Gasoline blending; plastic mfg.; fire extinguisher mfg.	Vapor thru respiratory tract; mucous membranes	Irritation of eyes and respiratory tract, vomiting, headache, anorexia, pallor, weakness, vertigo.
Ethylene Dichloride	Liquid	Explosive	Organic synthesis; solvents; anesthetic; thinner for lacquer	As a vapor thru respiratory tract; mucous membranes	Irritation of eyes and nose, vertigo, static and motor ataxia, retching, unconsciousness—death if exposure is prolonged.
Ethylene Oxide	Gas (room temp.)	Explosive	Insecticides; cellulosolve mfg.; synthesis of organic compounds	Mucous membranes; vapor thru respiratory tract	Headache, vomiting, dyspnea, diarrhea, irritation of mucous membranes of nose and eyes, vertigo, nausea, lymphocytosis, dullness, disturbances of respiration and of heart action, pulmonary edema.
Ethyl Ether (Sulphuric Ether)	Colorless liquid	Dangerous	Solvent; diluent; de-naturant and extracting agent; mfg. of medicinal; anesthetic	Vapors thru respiratory tract	Stupor, also slight irritation of mucous membranes, loss of appetite, headache, and loss in weight. Anesthesia, unconsciousness, paralysis, death.
Ethyl Silicate	Liquid	Slight	Silica-gel mfg.; water-proofing agent; glass mfg.	Mucous membranes; vapor thru the respiratory tract	Animal experimentation shows these compounds to be toxic, but no cases have been reported from industrial exposure.
Fluorine and Its Compounds					(See Hydrofluoric Acid).
Formaldehyde	Liquid	None	Organic synthesis; dyestuffs; rubber goods; licks; leather tanning; phenol and cresol; synthetic resins and lacquers	As vapor thru the respiratory organs and mucous membranes; skin irritant	Irritation of mucous membranes, conjunctivitis, bronchitis, dyspnea, severe dermatitis, destruction of finger nails; degeneration of the liver.
Formic Acid	Liquid	Explosive	Dyeing industry; leather tanning; rubber mfg.; reducing agent	Vapor thru mucous membranes; direct action on skin	(See also Formaldehyde) Dermatitis (blisters, ulcerations, necrosis), irritation of mucous membranes of eyes, nose and throat.
Formal	Liquid	Explosive	Dye mfg.; varnish mfg.; resin mfg.; paint remover	Vapor thru mucous membranes	Vapors are irritating and may be dangerous to eyesight.
Gasoline (Benzine)	Liquid	Explosive	Fuel for internal combustion engines; solvent; paint mixing; rubber cement	(See Benzene)	(See Benzene.)
Mexanone (Methyl-ethyl ketone)	Liquid	Slight	Lacquer mfg.; varnish removers; solvent	Vapor thru mucous membranes	According to U. S. Bureau of Mines, men exposed to 0.73, 0.63 and 2.0 percent vapor in air, pronounced the atmosphere extremely disagreeable even for a short time (1/4 to 1 minute) because of strong odor and irritation to eyes and nasal passages. One-tenth of 1 per cent was found to have a strong odor and moderate eye and nasal irritation. Concentrations producing no marked symptoms and apparently harmless to guinea pigs after one exposure of several hours have distinct warning properties of both odor and irritation that are very disagreeable to human beings.



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PHYSICAL PROPERTIES—Continued

Toxic Substance	Ordinary State	Fire Hazard	Principal Uses & Processes Producing Potential Hazard	Mode of Entrance Into Body	Diagnostic Signs and Symptoms
Hexane (Methyl Iso Butyl ketone)	Liquid	Slight	Solvent; lacquer mfg.	As a vapor thru nasal mucous	Irritation of conjunctival and nasal mucosa.
Hydrochloric Acid	Liquid	None	Chrome tanning; leather industry; organic synthesis; dyestuffs; chlorides; medicine; in organic preparations	As a gas thru the respiratory system; direct action on the skin and visible mucous membranes	Violent coughing, dyspnea, bronchitis, destruction of teeth, contraction of larynx, coma, caustic action on skin.
Hydrocyanic Acid	Liquid	None	Chemical analysis; medicine; insecticide; organic synthesis; military poison gas	As a fumes thru the respiratory system. Does not irritate the respiratory mucosa	In non-fatal doses. Vertigo, marked pallor, great prostration, feeble pulse and voice and cold sweats. The urine and exhaled breath may possess an odor of bitter almonds. Itching in the nose, with watery discharge and irritation of the throat. Large doses are instantly fatal.
Hydrofluoric Acid	Liquid	None	Ceramics; brewing and yeast; etching glass	As gas thru the respiratory organs. Direct action on the skin and mucous membranes	Conjunctivitis, bronchial catarrh, ulceration of the nostrils, gums and oral mucous membranes, ulcers of the culicis, suppuration under the finger nails. Caustic action on skin. (See Sulphuretted hydrogen.)
Hydrogen Sulphide					
Iodine	Crystalline	None	Dye mfg.; soaps, germicide; pharmaceutical mfg.	As a vapor thru respiratory system and mucous membranes	Irritation of mucous membranes of eyes and nose, inflammation of lungs. (See Nickel Carbonyl.)
Iron Carbonyl					
Iron Oxide	Fumes	None	Welding	Formes thru respiratory tract	Metal fume fever.
			Chemical apparatus; storage batteries; lead pigments; solder; alloys; piping; insulator; mining and smelting	As vapor or dust thru the respiratory organs, and digestive tract	Weakness, pallor, metallic taste in the mouth and fetid breath, lack of appetite, deposit of lead line on gums and presence of lead in urine. These symptoms are associated with anemia, gastritis, constipation, loosening of teeth, pain in the joints, paralysis, abdominal cramps and colic. Stippled red blood corpuscles.
Lead	Metal	None	Medicine; lead salts; weighing pill; paint pigments; insecticides	As vapor or dust thru the respiratory organs and digestive tract. Thru the skin	(See Lead.)
Lead Compounds Crystals; powder		Dangerous (Nitrates)			
Magnesium	Metal	Explosive	Alloys; paint mfg.; glass mfg.; rubber mfg.; magnesium refinishing; airplane parts	As dust and fumes thru respiratory tract; particles under skin	Metal fume fever. (See Zinc.)
					Languor and sleepiness, stolid mask-like facial expression, low monotonous voice, muscular twitching, varying from a fine tremor of hands to gross rhythmic movements of arms, legs, trunk and head; cramps and stiffness of muscles in legs, increase in tendon reflexes, ankle and patellar clonus, retroversion and propulsion, staggering gait, uncontrollable laughter and crying. Metal fume fever. (See Zinc.)
Manganese Dioxide	Solid; powder	None	Steel alloys; mining; watch mfg.; glass mfg.; dry cell batteries	Fumes and dust thru respiratory tract	Chronic inflammation of the gums and mucous membrane of the mouth; loss of teeth, necrosis of the jaw, ulcers in the mouth and pharynx, chronic gastritis, enteritis, anemia, furunculosis, anasthesia, mental depression, tremors of the hands and muscles of the face.
Mercury	Liquid metallic element	None	Mercury salts; thermometers; mercury vapor lamps; chemical processes	As vapor and dust thru respiratory organs. As solid thru the skin	Headache, drowsiness (chief danger is from explosion).
Methane	Gas	Explosive	Coal mining; processing of coal	Gas thru respiratory tract	Irritation of eyes and respiratory passages, vomiting, vertigo, dyspnea, fatal paralysis of the heart, chills, thirst, dilated immobile pupils, optic neuritis, blindness, abdominal cramps, paralysis, delirium, coma.
Methyl Alcohol (Methanol)	Liquid	Explosive	Solvent for varnish gums; organic synthesis; fuel; general solvent; dye mfg.	As vapor by inhalation	



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Toxic Substance	Ordinary State	Fire Hazard	Principal Uses & Processes Producing Potential Hazard	Mode of Entrance Into Body	Diagnostic Signs and Symptoms
Methyl Bromide	Liquid	None	Organic synthesis; and line dye making	As gas thru the respiratory organs and mucous membranes	Irritation of respiratory passages; muscular twitchings, cramps, convulsions; disturbance of sight, fever, delirium, coma. Nervous symptoms—unease, gait, heightened reflexes, loss of visual acuity, loss of memory, irritable temper—may persist for a long time (See note under Methyl Chloride)
Methyl Cellosolve (Ethylene Glycol Liquid Mono-Methyl Ether)	Liquid	Slight	Solvent; lacquer mfg.; fused color mfg.; varnish making; dye mfg.; airplane dope; solvent; resin, nitro-cellulose	As a vapor thru respiratory system	While it is not positively established, recent studies suggest that methyl cellosolve may affect the blood and blood-forming organs and the nervous system.
Methyl Chloride	Gas	None	Medicine; refrigeration; dye mfg.; chloroform mfg.; thermometers	As a gas thru the respiratory organs	Progressive drowsiness, insomnia, headache, vertigo, nausea, anorexia, apathy, staggering gait, mental confusion, weakness, visual disturbances, tremors, presence of formales and acetone in urine. Note—The U. S. Bureau of Mines studied the acute response of guinea pigs to a single exposure to vapors of methyl chloride, methyl bromide, ethyl bromide, and ethyl chloride. According to this Bureau all four produced similar symptoms, including excitement, loss of equilibrium, inability to walk, rapid pulse, convulsive rapid respiration with rales, frothy (often blood tinged) sputate from nostrils. The signs of lung irritation were not as pronounced for exposure to ethyl chloride as for the other compounds. The gross pathology was quite similar for all four of these alkyl halides and was characterized by congestion, hemorrhage, and edema of the lungs, and by injury to the vascular system, as shown by the tendency toward hemorrhage. Congestion was present in the organs of all groups, but parenchymal degeneration was most marked in those exposed to methyl bromide vapors. A distinct delayed effect of exposure was noted with methyl bromide and methyl chloride, to a lesser extent with ethyl bromide, but was not observed with ethyl chloride.
Methylone Chloride (Dichloromethane)	Liquid	None	Solvent; cellulose, fats, oils, resins, rubber; anesthetic cleaning fluids; artificial silk mfg.	Vapor thru respiratory tract	Headache, giddiness, stupor, irritability, numbness and tingling in the limbs, labored breathing, rapid weak pulse, cyanosis and possibly some degree of chronic anemia.
Methyl Formate	Liquid	Dangerous	Fumigants; refrigerant	As a vapor thru respiratory tract	According to the U. S. Bureau of Mines, men exposed for one minute to 0.15% vapor in air noticed the pleasant ethereal odor of methyl formate, but experienced no nasal or eye irritation or other signs or symptoms. While the odor of methyl formate is distinct and noticeable in concentrations which are relatively safe from the standpoint of producing acute poisoning, owing to its pleasant nature and the occurrence of olfactory fatigue it is doubtful whether the odor of methyl formate will serve as an effective warning of harmful conditions of exposure.
Naphtha (Petroleum)	Liquid	Dangerous	Rubber mfg.; paint mfg.; solvent	As vapor thru respiratory tract	(See Benzene.)
Naphthols (Coal Tar)	Crystalline Mass		Dye mfg.; chemical mfg.	Direct action on skin; may be absorbed thru skin. As vapor thru respiratory organs	Irritation of skin and kidneys. Injury to cornea and lens. In addition restlessness, vomiting, delirium, convulsions, and later, somnolence, paralysis, coma and death.

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Toxic Substance	Ordinary State	Fire Hazard	Principal Uses & Processes Producing Potential Hazard	Mode of Entrance into Body	Diagnostic Signs and Symptoms
Naphthylamines					
Nickel	Metal	None	Alloys; electroplating; storage battery mfg.	Direct action on skin when in solution; as dust thru respiratory system	See aniline and other amine compounds of benzol and its homologues. The only lesion reported to be caused by nickel, apart from the toxic effects of nickel carbonyl, is nickel eczema. This condition is reported mostly among nickel platers who are exposed to many dermatitis-producing substances. Some authorities question whether nickel is the responsible agent.
Nickel Carbonyl	Liquid	Explosive	Production of metallic nickel	As a gas thru respiratory organs	Giddiness, headache, nausea, constipation, dyspnea, cough, retrosternal soreness and epigastric pain, sleeplessness, cyanosis, edema of lungs, pain in the loins, hemorrhages—especially in the brain and the adrenals. Metal-lung fever. (See Zinc.)
Nicotine	Dust; Liquid	None	Tobacco production; insecticides; fertilizer	Absorption thru skin as a liquid; as a dust thru respiratory system	Acute cases may be fatal. In less severe cases there may be severe prostration, gastric upsets, cardio-vascular collapse, precordial distress, dyspnea. Tonic amblyopia has been reported by some authorities to be a chronic effect of nicotine poisoning.
Nitroamines					
Nitric Acid & Nitrous Fumes	Liquid	Explosive when in contact with combustible material	Organic synthesis; mfg. of dyestuffs, drugs, explosives, celluloid and nitrates; metallurgy; medicine; photo engraving	As vapor thru respiratory system, and direct action on the skin	(See Aniline.) Irritation of air passages, spasmodic cough, dyspnea, pulmonary edema, bronchitis, feeling of suffocation, pain in chest, digestive disturbances, peripheral vaso-dilatation, methemoglobinemia and its sequelae, and depression of the central nervous system, corrosion of teeth, severe burns on the skin. Continued exposure to diluted fumes is said to cause chronic inflammation of the respiratory tract and a general disability characterized by headache, sleeplessness, anorexia, gradual loss of strength, dyspepsia, constipation, and ulcers on the lips and mucous membranes of the mouth and pharynx.
Nitrobenzene & Other Compounds of Nitrobenzene	Liquid	Dangerous	Perfumes; mfg. of aniline; mfg. of dust preventives; mfg. of inks; explosives; gasoline blenders; shell fillers	As a vapor thru respiratory system; absorption thru skin	Cyanotic face and lips, somnolence, headache, vertigo, nausea and vomiting; odor of bitter almonds in breath; unsteady gait, tremors, muscular twitching, and other manifestations of nerve injury; anemia, visual disturbances, methemoglobin formation, presence of hematinporphyrin, albumin, and sometimes free poison in urine; eczematous eruptions.
Nitro-Glycerine	Liquid	Explosive	Explosives; medicine; shell fillers; pharmaceuticals	Inhalation of vapor thru respiratory tract; absorption thru skin	Redness of face and conjunctivae, intense headache, mental disturbances, vertigo, fainting, tremors, burning sensation in throat and stomach, nausea, vomiting, colic. Chronic:—Digestive disturbances and neuralgia.
Nitro-Naphthalene	Crystals	Explosive	Dyestuffs	(See Nitro benzol)	(See Nitro benzol.)
Oxalic Acid	Crystalline solid	None	Bleaching; dyeing; shoe polishes; dry cleaning; dye mfg.; bookbinding	Direct action on skin and mucous membranes as dust	Local caustic action on skin, bluish discoloration and brittleness of nails, irritation of mucous membranes, including those of esophagus, stomach and intestines; peripheral circulatory trouble, cardiac weakness, nervousness, convulsions.
Ozone (O ₃)	Gas	Explosive	Oxidizing agent; bactericide; bleaching oils, waxes, textiles, etc.	As a gas thru respiratory tract	Irritation of eyes and respiratory tract, headache, cough, pulmonary edema, depression and coma.
Pentamene (Methyl Propyl Ketone)	Liquid	Dangerous	Organic solvent; lacquer mfg.	As a vapor, direct action on mucous membranes	Irritation of eyes and nasal passages; larger doses cause narcosis.
Perchlorethylene					
					(See Tetra Chloroethylene.)

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Task Substance	Ordinary State	Fire Hazard	Principal Uses & Processes Producing Potential Hazard	Mode of Entrance Into Body	Diagnostic Signs and Symptoms
Petroleum & Its Volatile Products	Liquid; solids	Dangerous	Motor fuels; lubricants	As a solid, direct action on skin; as a vapor thru respiratory organs	(See also Benzene.) Irritation to skin and respiratory organs may cause acute inflammation to the lungs and headache, general dyspnea, etc. Workers in petroleum refineries are subject to acute keratitis, conjunctivitis, and meteoses from petroleum, paraffin, and petroleum residue. Workers exposed to petroleum oils and greases in a number of industries are subject to folliculitis, boils and acne.
Phenol (Carbolic Acid)	Crystalline solid	Slight when heated	Phenol, formaldehyde, resins, mfg.; germicides; chemical mfg.	As a vapor thru digestive tract and respiratory tract; direct action on skin and mucous membrane; absorption thru skin	Irritation of the skin, burning, pain, etc. Irritation of the respiratory organs and eyes. Symptoms of acute poisoning following breathing with phenol include: headache, vertigo, nausea, vomiting, fainting, dyspnea, excitement, convulsions, respiratory paralysis. Symptoms of chronic exposure include: Emaciation, vomiting, diarrhea, anemia, headache, vertigo, weakness, depression, etc.
Phenyl Hydrazine	Crystals or liquid	None	Organic synthesis; reagent in analytical chemistry	Absorption thru skin	Vesicular eruption, inflammation, etc. Irritation of the skin and mucous membranes.
Phosgene (Carbonyl Chloride)	Liquid	None	Lethal gas; dyestuff mfg.; chlorinating agents; bleaching sand for glass mfg.	As a vapor thru respiratory system	Irritation of eyes, burning of the nose, throat, and lungs, intense dyspnea, and pulmonary edema, cyanosis, feeble heart, death in coma.
Phosphorus	Crystals	Explosive	Mfg. and poison; production of phosphorus; alloys; explosives; fire works; insecticides	As a vapor thru respiratory system; as a solid thru digestive system	Increasingly severe irritation of digestive disturbances, swelling and penetration of the gums and buccal membrane, loosening and falling out of the teeth, suppuration and destruction of jawbone with fistulous channels burrowing through the cheek, malodorous and malodorous emanation. Irritation of the bones, other than the jawbone, has also been reported. A different type of poisoning marked by general and systemic effects is also recognized.
Phosphine (Phosphoretted Hydrogen)	Gas	Dangerous	Blas furnaces; welding; acetylene work; phosphorus extraction; organic preparations	As a gas thru respiratory organs	Oppression in chest, burning and vertigo, general irritation, dyspnea, general debility, tremors and numbness, pain in the region of the nuchal arm and feeling of chill. Symptoms similar to those of phosphorus poisoning are said to have resulted from prolonged exposure to low concentration of phosphine.
Ploric Acid (Trinitrophenol)	Crystals	Explosive	Explosives; medicine; dyeing silk; disinfectant; dye mfg.; photography; tanning	As dust thru respiratory system; direct action on skin	Gastritis, vomiting, diarrhea, vertigo, convulsions, etc. Irritation of the skin and mucous membranes, inflammation of mucous membranes.
Potassium Hydroxide	Deliquescent pieces lumps or sticks	Dangerous	Soap mfg.; bleaching; medicine; reagent in analytical chemistry; ink mfg.; metal mfg.	Direct action on the skin as dust attacking the visible mucous membranes and digestive organs	Deadly if swallowed. Severe chemical burning of the skin and mucous membranes. Formation of deep scaled and persistent ulcers, loss of nails.
Pyridine	Liquid	Dangerous	Denaturant for alcohol; medicine; solvent in rubber, paint and other industries; explosives; paint mfg.	As a vapor thru the respiratory organs; direct action on the skin	Hoarseness, laryngitis, headache, vertigo, tremors, choking, weakness of the extremities, eczema.
Selenium Compounds	Semi-metallic crystals	None	Glass mfg.; paint mfg.; alloys; anti-oxidants; lead and zinc smelting; welding; cement mfg.	Direct action on skin as dust; fumes or vapors, thru respiratory tract and digestive tract	Dermatitis, pain, gastro-intestinal trouble, turbidness, garlic odor of breath and perspiration, irritation of nose and throat, coating of tongue, metallic taste in mouth and nervousness.
Silver & Its Compounds	Metal; crystals	None	Mirror silvering; coin mfg.; silverware; indelible ink mfg.; photography	Absorption thru and direct action on skin	Dermatitis, caustic action. Argyria, a grayish blue or black discoloration of the skin and mucous membranes, is the chief effect reported in industry.

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Toxic Substances	Ordinary State	Fire Hazard	Principal Uses & Processes Producing Potential Hazard	Mode of Entrance into Body	Diagnostic Signs and Symptoms
Sodium Hydrazide	Deliquescent pieces, lumps and sticks	Dangerous	Petroleum refining; tanning; soap industry; textile industry; organic synthesis; medicine; rubber industry	Direct action on the skin. As dust attacking the visible mucous membranes; digestive tract	Severe chemical burning of the skin and mucous membranes. Formation of deep sores and persistent ulcers, loss of nails. Deadly if swallowed.
Sulphur Chloride Liquid		None	Rubber mfg.; insecticide; dyeing textiles; medicine; war gas; vulcanizing	As a vapor thru mucous membranes of eyes and respiratory tract	Irritation of mucous membranes of eyes and respiratory tract.
Sulphur Dioxide Gas		None	Artificial ice industry; bleaching; preservative for beer, wine, and meats; cellulose and paper industry; mining and smelting	As a gas thru the respiratory organs	Bronchitis, coughing, bluish discoloration of mucous membranes, spasmodic laryngitis, angina, broncho-pneumonia, dyspnea, bloody sputum, digestive disorders.
Sulphurated Hydrogen (Hydrogen Sulphide)	Gas	Explosive	Reagent, analytical chemistry; in sawmills; tanning; coal gas mfg.; soda mfg.; frequently mixed with other harmful gases; mining and smelting; paper makers	As a gas thru the respiratory system	Acute poisoning: Disorganization of blood, burning pains in the eyes, nose, and throat, cough, conjunctivitis, gastritis, dyspnea, numbness, slow pulse, headache, perspiration, contracted pupils, convulsions, paralysis. Chronic poisoning: Conjunctivitis, exhaustion, dyspnea, pallor, slow pulse.
Sulphuric Acid	Dense oily liquid	Dangerous	Fertilizers; petroleum refining; explosives; organic synthesis; inorganic preparations; leather and textile industries; metallurgy; chemicals	As a vapor thru the respiratory system; locally as a cutaneous irritant	Acute and chronic bronchitis, broncho-pneumonia, decay of teeth. On the skin local pain, redness, edema, ulceration.
Tar & Pitch	Solid; viscous liquid	Slight	Preserving wood; roofing; road repair; insulating paint mfg.; creosote mfg.	Vapors thru respiratory tract; direct action on skin	Melanosis, tar itch, acne, eczema, or psoriasis, ulcers of the skin and cornea, warts, epitheliomatous cancer, loss of appetite, nausea, diarrhea, headache, vertigo, irritation of the respiratory tract, conjunctivitis, albuminuria, edema, ichthuria.
Tellurium Compounds	Semi-metallic & crystals	None	Coloring glass; rubber mfg.; refining of lead, zinc and copper	Absorption thru skin; dust and fumes thru the respiratory tract; direct contact with skin	Garlic-like odor of breath and of secretions and excretions, suppression of sweat, dryness of the mouth. Dry itching skin, metallic taste, anorexia, nausea, vomiting, indigestion, constipation, and somnolence.
Tetrachloroethane (Methylene Chloride)	Liquid	None	Varnish mfg.; solvent for greases, waxes and cellulose acetate; artificial silk mfg.; airplane dope; dry cleaning; rubber mfg.	As a vapor thru the respiratory tract	Severe headache, nausea, insomnia, abnormal fatigue, enlargement and tenderness of the liver, delirium, vomiting of blood, abdominal pains, gastro-intestinal disorders, general discontent and nervousness, coma, and death.
Tetrachloroethylene (Perchloroethylene)	Liquid	None	Solvent; degreaser; dry cleaner; printing; soap mfg.	As a vapor thru upper respiratory passages and mucous membranes	Irritation of eyes, lightness in frontal sinuses, increased perspiration of hands and increased secretion of mucus from nasal passages, nausea, elation, faintness, dizziness, dyspnea, retarded mental activity, headache, and visual disturbances.
Tetraethyl Lead (Also see lead & its compounds)	Liquid	Dangerous	Added to motor fuel gasoline in order to eliminate the knock in the internal combustion engine	Highly absorbed thru the skin. As a vapor thru the respiratory system	Insomnia, slight fall in blood pressure, and in body temperature, stippled red blood cells, tremors, sudden violent twitching, excretion of lead in the urine, vertigo and headache, nausea and vomiting, tremors, loss of weight, anorexia, lead encephalopathy.
Tetryl (Trinitrophenylmethyl-trinitramine)	Powder crystals	Explosive	Mfg. of explosives	As a dust thru respiratory tract and direct action on skin	Abdominal pain, asthmatic attacks, hemorrhage from mucosa, headaches and giddiness; dermatitis.
Thallium & Compounds	Metal crystals; powder	None	Glass mfg.; color mfg.; thallium salts; luminous paint mfg.; insecticides; dye mfg.	As vapor or dust thru the respiratory organs and digestive tract	Loss of appetite, fatigue, albuminuria, joint pain, loss of hair, optic neuritis and blindness.

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Toxic Substance	Ordinary State	Fire Hazard	Principal Uses & Processes Producing Potential Hazard	Mode of Entrance into Body	Diagnostic Signs and Symptoms
Tin	Metal	None	Tin plate; alk weighing; dye mordant	As fumes thru respiratory organs	Not generally regarded as industrial poison. Reported to cause feeling of chilliness in the chest, pain in the throat, heaviness in the stomach, anemia and traces of tin in urine and feces.
Titanium Dioxide	Crystalline	None	Paint mfg.; dyeing; paper mfg.; steel alloys		Used as a substitute for white lead in the manufacture of paint. No ill effects have been reported as a result of its use in industry.
Toluene	Liquid	Explosive			(See Benzol.)
Trichloroethylene	Liquid	None	Degreasing; dye mfg.; solvent; insecticide; chemical mfg.; paint mfg.; varnish mfg.; rubber workers	As a vapor thru the respiratory system	Effects not fully established. Symptoms of acute poisoning include excitement, drunkenness, dizziness, nausea, vomiting, unconsciousness; sequelae include headache, vertigo, anemia, disturbed heart action. Severe irritation of the respiratory passages has also been reported, but this effect is ascribed by some authorities to the action of its decomposition products phosgene and hydrochloric acid. Chronic exposure is said to result in injury to the laryngeal and optic nerves. Impurities in trichloroethylene, it has been suggested, may be the cause of these injuries. Other effects are addiction and skin irritation.
Trinitrophenol	Liquid	Explosive	Explosives; match mfg.; leather mfg.; glass mfg.		(See Picric Acid.)
Trinitrotoluene (TNT) (Also see Nitrobenzol)	Monoclinic needles	Explosive	Explosives	As dust or fumes thru the respiratory mucous membranes, and thru the pores of the skin. Thru gastrointestinal tract	Bitter taste in the mouth, headache, nausea with white frothy vomiting, gripping abdominal pain, increase in blood pressure, severe nose bleed, dermatitis, gastritis, urine dark colored and contains blood.
Triorthocresyl Phosphate	Liquid	None	Lacquer mfg.; plastic mfg.	Thru digestive tract	No clear-cut cases have been reported from industry. It is not highly volatile, but if absorbed it may cause paralysis of extremities. (This was the cause of the epidemic of so-called "Jake Leg," several years ago.)
Turpentine	Liquid	Explosive	Solvent; paints; varnishes; lacquers; medicine; wax mfg.; printing; photographers; dye mfg.; ink mfg.; dry cleaning	As a vapor thru the respiratory passages. As fluid it acts on the epidermis	Irritation of mucous membranes of eyes, nose and upper air passages, bronchial inflammation, salivation, headache, vomiting, abdominal pain and vertigo, state of excitement resembling drunkenness, irritation of kidneys and bladder, strangury, odor of violets in urine, severe irritation of skin.
Uranium	Metal; crystals	Pyrophoric	Dye mfg.; tile mfg.; paint mfg.; uranium mining; photography	Direct action of radiant rays on skin. Thru respiratory organs	Uranium, reported to be one of the most toxic of metals, is a source of radiant energy. A high frequency of cancer of the lungs in Czechoslovakian miners of uranium is believed to be due to the radio-activity of the ore. Very little has been published on the effects on man of exposure to uranium salts. The conditions reported include purpura of the legs, reduction of leukocytes, as well as diminution of red corpuscles, a reduction in urinary elimination of nitrated salts, and an increase in the chlorides. Experiments on animals with uranium nitrate are reported to show nephritis, glycosuria, albuminuria, gastro-intestinal disorders, degeneration of liver, affections of nervous system.
Vanadium	Metal	None	Steel alloying; dye mfg.; glass and porcelain mfg.; ceramics; ink mfg.; vanadium steel workers	Fumes and dust thru respiratory tract. Digestive tract and mucous membranes	Anemia, cachexia, irritation of respiratory tract, dry cough resulting in hemorrhages, diarrhea or constipation, emaciation, involvement of kidneys, hysterical manifestations, melancholia.

S-4372-M

The Firestone Tire & Rubber Company

SUBJECT TO DISCLOSURE RESTRICTION

40751



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Cancels 4-18-63

C. COMMON INDUSTRIAL HAZARDS

PHYSICAL PROPERTIES—Continued

Toxic Substance	Ordinary State	Fire Hazard	Principal Uses & Processes Producing Potential Hazard	Mode of Entrance Into Body	Diagnostic Signs and Symptoms
Vinyl Chloride	Gas	Slight	Organic synthesis principally resins	As a gas thru upper respiratory tract	The U. S. Bureau of Mines reports that men exposed to 2.5% for approximately 3 minutes soon began to feel dizzy and disoriented as to space and size of surrounding objects and complained of a burning sensation in the soles of the feet. They immediately recovered on leaving the chamber, and complained only of a slight headache which lasted about 90 minutes. (See Benzol.)
Xylene	Liquid	Explosive			
Zinc	Metal	Dangerous (dust)	Metallurgy; organic synthesis; galvanizing; boiler plates; zinc smelting; brass foundries	As dust and as a vapor thru the respiratory system	Metal fume fever characterized by: irritation of respiratory tract, dryness of throat, dry cough, malaise, headache, nausea, severe chills with fever, pains in limbs, shaking in limbs, sweating, leukocytosis. Metal fume fever may also be caused by fumes of lead, mercury, manganese, cadmium, arsenic, antimony, and many other metals. Metal fume fever resulting from metals which may cause systemic poisoning should be regarded as a warning that continued exposure may have more serious effect.

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Cancels None

B. COMMON INDUSTRIAL HAZARDS

Handwritten: P-302 - (BENZOL)
Handwritten: This part is cancelled.

Chronic poisoning by benzol (benzene) is so serious in nature that it is to be used in production only if no other material will perform satisfactorily. Its use, even in small quantities, normally requires a closed system or excellent local exhaust ventilation, ~~(spot ventila-
tion)~~. Under no condition will general ventilation be relied upon to control benzol vapor.

Air concentrations in the workplace must be kept below 25 ppm. Benzol vapor can be determined by simple colorimetric devices, but not by needle type instruments. The Industrial Hygiene Department has suitable instruments. *such as explosimeters or combustible gas indicators.*

The Industrial Hygiene Department is to be informed well in advance of a proposed factory use.



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C. COMMON INDUSTRIAL HAZARDS

DIMETHYL SULFOXIDE -(DMSO)

A chemical relatively new to industry, Dimethyl Sulfoxide (DMSO), is coming into use, particularly in the Synthetic Fiber industry. Very little is presently known about its toxicity and there is ~~nothing~~ *little* available ~~about its toxicity if inhaled.~~

ON its inhalation toxicity - PRECAUTIONS -
Make certain that if this chemical is introduced into your Plant that the Industrial Hygiene Department is notified. Make every effort to prevent all skin contact. Inhalation should be held to a minimum by use of exhaust ventilation.

It is known that DMSO penetrates the intact skin readily, sometimes produces skin irritation, and markedly increases skin absorption of other materials which are on the skin. Herein lies one of the potential dangers; many chemicals which have little effect on the skin may have a serious effect when they ~~enter the body~~, having been carried ~~in~~ *through the skin* by DMSO.
or lethal *penetrate it,*



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C. COMMON INDUSTRIAL HAZARDS

HYDROGEN SULFIDE *Gen.*

Hydrogen sulfide is a colorless gas with a rotten egg odor. Inhalation of high concentrations causes unconsciousness and collapse within seconds, and concentrations above 600 ppm are rapidly fatal.

A factor which contributes to such tragedies is the fact that inhalation of the gas deadens the sense of smell rapidly, leading to a false sense of security. Indeed, above about 200 ppm the disagreeable odor initially appears less intense than at lower concentrations, and lethal quantities produce immediate paralysis of the sense of smell.

For these reasons many persons have lost their lives attempting to save a workman who has collapsed from exposure. The fatal collapse of a first victim often initiates a chain of similar tragedies as heroic fellow-workers rush unprotected into the contaminated area in an attempt to rescue those who have already fallen victim. Not infrequently two or three deaths occur because of the natural desire to help a fellow-worker.

Exposure to hydrogen sulfide may occur in many ways. Some of the more common ones are:

1. In sewers.
2. From laboratory use of the gas.
3. From contact of water or acid with sulfides.
4. In wells.
5. In excavating in swampy or filled ground.
6. As a side product in many chemical reactions and processes.

See Vol. I, Sec. VI, page 6.2.B.1 for guidance on respiratory protection. Chemical cartridge respirators must not be used for protection, and gas masks must not be used inside tanks and other enclosures where there may be high concentrations, in which case only supplied air equipment is satisfactory.

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Cancels None

C. COMMON INDUSTRIAL HAZARDS

RP-13947

RP-13947 is a skin, eye and respiratory irritant. In case of contact:

1. Remove from skin with mineral oil, then wash thoroughly with soap and water.
2. For eyes, flush immediately with copious quantities of water for at least 15 minutes and get medical attention. *Change to respiratory ventilation*
3. Remove contaminated clothing and launder before wearing it again. *Re-use*

RP-13947 is handled in unopened bags and inhalation should not be a problem if the Banbury is effectively ventilated.

No health hazard is likely after RP-13947 is incorporated into the rubber compound. If respiratory protection is needed, for example, in disposing of broken bags, a respirator approved for dusts that are not significantly more toxic than lead is satisfactory.

*Are we still using this?
Check with End Rous.*



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Cancels None

C. COMMON INDUSTRIAL HAZARDS

CADMIUM OXIDE FUME

Great care must be taken to prevent the inhalation of fumes of cadmium oxide. It is an insidious chemical, as lethal quantities may be inhaled without sufficient irritation to give warning at the time of exposure. A single exposure can cause lung irritation which may be fatal. There have been numerous fatal or serious poisoning cases from inhalation of cadmium oxide fume; there were at least two deaths in the United States during 1965. The Threshold Limit Value of cadmium oxide fume is 0.1 mg. per cubic meter of air, which is one-half The Threshold Limit Value of lead, a more universally recognized, serious metallic poison.

It is produced:

1. During silver brazing. Some silver brazing alloys in common use contain large percentages of cadmium.
2. During welding or cutting metals plated with cadmium.
3. From heating cadmium plated nuts, bolts and rivets.
4. From the use of a blow torch on flanged cadmium plated steel pipe.
5. Whenever cadmium metal is heated sufficiently.

When there are operations such as those described above, local exhaust ventilation which captures the fume is the best means of preventing inhalation. Where there are infrequent exposures which last only a few minutes, a fume respirator prevents inhalation. Dust respirators do not afford adequate protection.

Cadmium plated shaft collars, used for locking shafts in place, are in use in some of our plants. They are ordinarily locked in place with set screws, but occasionally they are welded to the shaft. As pointed out above, welding produces cadmium oxide fume.

Early symptoms of intoxication include dryness of the throat, coughing, a feeling of constriction in the chest, shivering and headache. Nausea and vomiting are less common. Symptoms are delayed and usually appear after significant exposure has occurred. Later, a chemical pneumonia develops, with excruciating pain in the chest, difficulty in breathing, and prostration. In non-fatal cases the intensity of respiratory distress may increase for a few days followed by recovery in 8 to 10 days.

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C. COMMON INDUSTRIAL HAZARDS

CADMIUM OXIDE FUME - Continued

Cadmium is quite toxic in the stomach; it causes symptoms similar to those of food poisoning within one-half to one hour after ingestion. Eating and storing food in work areas must be prohibited and workmen should wash thoroughly before eating, smoking or leaving work. Good housekeeping is important.



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Cancels None

C. COMMON INDUSTRIAL HAZARDS

typ. change to amend. 1 CARBON TETRACHLORIDE

The danger of carbon tetrachloride poisoning is so great that it is to be used in production ONLY WHEN NO OTHER MATERIAL will perform satisfactorily. Either a short exposure to a high concentration of this material or repeated exposures to low concentrations may result in serious injury or death. It affects the liver and kidneys principally through inhalation, although skin contact with the liquid contributes to overall exposure. Alcoholics and persons who have consumed significant amounts of alcohol are more susceptible to this type of poisoning.

Air concentrations in the workplace must be kept below 10 ppm, therefore its safe use, even in small quantities, normally requires either a closed system or excellent local exhaust ventilation. Laboratory use must be confined to a well ventilated hood.

Safe air concentrations of carbon tetrachloride are not detectable by odor; in fact, if the odor is noticeable upon first entering the workplace, excessive exposure is occurring.

The Industrial Hygiene Department is to be informed well in advance of any proposed factory use, even temporary use; the Industrial Hygiene Department has the equipment required for the determination of carbon tetrachloride vapor in air. It is recommended that plant safety also be informed well in advance of a proposed use. *ENGINER*

The use of carbon tetrachloride fire extinguishers is illegal in some governmental jurisdictions, including the State of Ohio.



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C. COMMON INDUSTRIAL HAZARDS

CARBON MONOXIDE

Of all the gases that have effects upon man, carbon monoxide is the most widely encountered. It exerts its effects by combining with the hemoglobin of the blood and interrupting the normal oxygen supply to the body tissues. Carbon monoxide is taken up by the blood 200 times more readily than oxygen. This prevents the oxygen from combining with the hemoglobin and being carried to the cells. The effect is termed carbon monoxide asphyxia, and involves the prevention of gaseous exchange between the air breathed and the body transport system, as opposed to suffocation, which is a mechanical blockage of air intake. Although the resulting oxygen deficiency is a reversible chemical asphyxia, nevertheless damage from severe asphyxia from any cause may not be entirely reversible.

The effect of carbon monoxide on man is enhanced by many environmental factors such as heavy labor, high temperatures, and high altitudes. Symptoms such as headache, fatigue and dizziness appear in healthy workers engaged in light labor when about 20 percent of the hemoglobin is combined with carbon monoxide. Such degree of saturation is achieved by continuously breathing air containing 100 parts per million (ppm) carbon monoxide for 6 to 8 hours.

The threshold limit value for carbon monoxide has been set at 50 ppm.

Workmen affected by carbon monoxide should be removed from the contaminated environment immediately and given medical attention.

Exposure to carbon monoxide, a tasteless, odorless, colorless gas, may occur whenever carbonaceous matter, such as carbon black, coal, wood, paper, oil, gas, gasoline or any other organic material is burned. It is a product of incomplete combustion.

Carbon monoxide is commonly produced by:

- (1) Internal combustion engines.
- (2) Furnaces (other than electric).
- (3) Water heaters. (other than electric).
- (4) Stoves.
- (5) Overheated compressors.

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C. COMMON INDUSTRIAL HAZARDS

CARBON MONOXIDE • Continued

Cigarette smoking is a source of carbon monoxide exposure. Cigarette smoke, as inhaled, contains 200 to 800 ppm carbon monoxide.

Many operations involving the use of tractors and lift trucks in industry take place in limited areas, often having poor ventilation and little air movement. The carbon monoxide produced can become a serious hazard, especially when workers in the area are performing hard labor.

Removal of carbon monoxide from the work atmosphere can be accomplished by:

- (1) General ventilation to control exhaust fumes from tractors, lift trucks and other internal combustion vehicles.
- (2) Venting of furnaces, heaters, and stationary internal combustion engines to the outside atmosphere.

Contrary to popular opinion, LPG (propane) fueled engines do produce carbon monoxide. It is generally accepted that an LPG engine in good adjustment will produce less carbon monoxide than a gasoline engine in good adjustment. In a normal state of repair, LPG engines produce amounts of carbon monoxide comparable to their gasoline counterparts and will not serve to eliminate the health hazard. They produce less carbon monoxide than gasoline engines only with excellent maintenance of the engines.

Carbon monoxide intoxication has been caused by contaminated air taken into compressors. Intake openings of air compressors used for supplying air to breathing equipment should be located at sites or in positions that offer the least possible likelihood of carbon monoxide intake and well away from exhaust outlets of fuel burning equipment.

The home office Industrial Hygiene Department has equipment to check carbon monoxide in air and should be called upon for any assistance needed.



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C. COMMON INDUSTRIAL HAZARDS

OZONE

Ozone and ozone generators shall not be used in occupied areas for odor control.

Ozone does not destroy odors, but masks ^{them} the odor and appears to "freshen" the air by lowering the perceptibility of odors. Odors of high intensity cannot be successfully masked by concentrations of ozone which are safe for prolonged inhalation.

Ozone is a toxic chemical. It is very irritating to all mucous membranes, and significant exposures cause lung irritation.

The threshold limit value is 0.1 ppm.



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C. COMMON INDUSTRIAL HAZARDS

ISOCYANATES

GENERAL

Isocyanates sold under various trade names are widely used as raw materials in the manufacture of polyurethane elastomers (foams, castings, and coatings) and in adhesives. Two of the most commonly used ones are toluene diisocyanate (TDI) and methylenebis (4-phenylisocyanate) (MDI). TDI is a liquid at room temperature with a vapor pressure of 0.05 mm Hg at 77°F. MDI is a solid at room temperature. Heat is generated when isocyanates react with other ingredients.

PHYSIOLOGICAL PROPERTIES

1. The acute inhalation toxicity of isocyanates is high. They are severe respiratory irritants. Long term overexposure to excessive air concentrations results in bronchial irritation; in some individuals, an asthma-like sensitivity develops.

Individual sensitivity varies widely. Once an individual is sensitized, the slightest exposure triggers a severe respiratory response. The affected individual must usually be medically restricted from all further exposure.

The Threshold Limit Value of both TDI and MDI is 0.02 ppm. Limits for others have not been established. Temporary excursions above 0.02 ppm are undesirable. Workmen may be affected if the air concentration exceeds 0.06 ppm for as little as 15 minutes.

2. Skin irritation may occur from contact with TDI or MDI. Eye contact may cause injury. An air concentration of 0.5 ppm TDI irritates the eyes.

ODOR

Odor ^{must} ~~should~~ not be relied upon as an index of overexposure since the air concentration of TDI which produces a detectable odor is approximately 0.4 ppm, far above the Threshold Limit Value. Detection of TDI by odor indicates acute overexposure.



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C. COMMON INDUSTRIAL HAZARDS

ISOCYANATES - Continued

ENVIRONMENTAL CONTROL

Local exhaust ventilation is necessary at all phases of manufacturing up to the point where polymerization is virtually complete. When formulations containing isocyanates are sprayed, supplied air respirators are usually necessary in addition to ventilation.

STORAGE AND HANDLING

Water and acid generate carbon dioxide gas when mixed with isocyanates. This may cause violent rupture of closed vessels. Moisture must never be allowed to enter storage or transfer systems. Contact with strong alkali may cause uncontrollable polymerization.

WORKPLACE EVALUATION

Industrial hygiene surveys for airborne isocyanates are to be made by the Home Office Industrial Hygiene Department. Ask for them prior to the start-up phase of all new operations so that potential trouble spots can be located early and any necessary corrective action taken before workmen are affected. Follow-up surveys will be made as needed and should be asked for when substantial process changes are made.



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C. COMMON INDUSTRIAL HAZARDS

CODE 327 *This will*

proposed
The current Threshold Limit Value is 2 ppm. Preferably, Code 327 should be handled in a closed system. *The value proposed in 1970 is 2 ppm.*

SKIN CONTACT

Code 327 is a skin irritant. A small percentage of individuals who have repeated contact acquire a sensitivity. Sensitized individuals must usually be medically restricted from all further work with the material. In case of contact, remove from the skin immediately with copious quantities of water.

EYES

Sharon: complete reaction with one standard recommended
Two or three ppm in air causes a very mild tingling in the eyes. At 5 ppm, discomfort increases rapidly and some mild lachrymation occurs in most people. If the liquid is splashed in the eyes, remove immediately by washing with copious quantities of water for at least 15 minutes. Extremely prompt action is required to prevent coagulation of the surface of the cornea. Permanent damage may result. All eye cases must report to the Medical Department.

INHALATION

Two or three ppm causes a very mild tingling in the nose and back of the throat. Long exposures at 5 ppm are decidedly unpleasant. Ten ppm causes almost immediate irritation and it becomes difficult to inhale normally.

FIRE HAZARD

71% to 73%
The vapor is explosive from ~~71-73%~~ by volume in air. Code 327 stabilized with 15% methyl alcohol has a flash point of 122°F.

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Cancels None

C. COMMON INDUSTRIAL HAZARDS

CODE 775

Because of the potential toxicity, Code 775 should be handled and used with caution.

A Threshold Limit Value has not been established.

SKIN CONTACT

It is a skin irritant. Solutions are readily absorbed through the skin. In case of contact, wash thoroughly with copious quantities of water. A small percentage of individuals will develop a skin sensitivity to Code 775.

EYE CONTACT

Sharon: use standard entry to complete sentence.

It may cause eye damage. In case of contact, ~~wash eyes with copious quantities of water for at least 15 minutes and get medical attention.~~

INHALATION

Causes local damage by direct irritation of the tissues.

TOXICITY

May cause damage to liver, kidneys, lungs, and spleen.

RESORCINOL (RP-775)

GENERAL

Because of the potential toxicity, resorcinol should be handled and used with caution.

A Threshold Limit Value has not been established.

SKIN CONTACT +++

It is a skin irritant. Solutions are readily absorbed through the skin. In case of contact, wash thoroughly with copious quantities of water. A small percentage of individuals will develop a skin sensitivity to resorcinol. Sensitized individuals must usually be medically restricted from all further contact.

EYE CONTACT +++

It may cause eye damage. In case of contact, hold eyelids open and wash immediately with a gentle stream of water for at least 15 minutes, preferably at an eye fountain. Get medical attention.

INHALATION +++

Avoid inhalation of dust and vapor. Causes local damage by direct irritation of the tissues. Excessive exposure may cause damage to liver, kidneys, lungs, and spleen. Hazardous vapors occur only at elevated temperature, and are not a problem at room temperature.

INGESTION +++

Harmful if swallowed. Do not take internally. If swallowed, drink large quantities of water immediately. Induce vomiting unless patient is unconscious or in shock. Get medical attention immediately.

FIRE HAZARD ++

Flash point is 335°F (open cup). No danger of explosive vapors at ordinary temperature. Material will burn.

Home Office Industrial Hygiene Department
The Firestone Tire & Rubber Company

GLW:ss
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cancels issue of 4/12/68



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C. COMMON INDUSTRIAL HAZARDS

CODE 303 (RP-9158, RP-11117)

The current Threshold Limit Value is 100 ppm. It is moderately toxic for both acute and chronic exposures.

INHALATION

Exposure to 400 ppm causes fatigue, insomnia, restlessness, and mental confusion. Exposure to 600 ppm causes nausea, headache, and dizziness in three hours.

Chronic overexposure may cause some blood changes, but these are much less severe than those seen in cases of benzene intoxication.

SKIN CONTACT

The chemical causes a defatting action which results in dermatitis if there is repeated and prolonged contact.

EYES

An air concentration of 200 ppm is distinctly irritating. In case of contact with the liquid, ~~flush with copious quantities of water for at least 15 minutes and get medical attention.~~

FIRE HAZARD

Flash point: 63-77°F.

Explosive limits: 1.1%^{to} 6.6% by volume in air.

Since the commercial product is a mixture of isomers, the physical properties may vary somewhat, depending on the composition.

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10-3-62

C. COMMON INDUSTRIAL HAZARDS

RP-12437

RP-12437 is a chlorinating agent described in a data sheet by the Wyandotte Chemical Corporation.

RP-12437 decomposes and releases free chlorine when milled, and in the presence of moisture, releases hypochlorous acid, hydrochloric acid, and some free chlorine gas. Since RP-12437 and these chemicals are eye, nose, throat, and lung irritants, precautions should be used in handling.

Use rubber gloves, goggles and respirators together with adequate ventilation. Protective equipment and ventilation are mandatory if RP-12437 is milled.

Guard against spilling and getting the dust on the skin. Wash thoroughly with water if skin contact occurs. If eye contact occurs, wash with copious quantities of water for at least 15 minutes and get medical attention. *standard working.*

RP-12437 is an oxidizing agent. Do not mix with other chemicals on a large scale without pre-testing on a small scale for compatibility and stability, including storage testing. STORE IN A COOL, DRY AREA.



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C. COMMON INDUSTRIAL HAZARDS

RP-14339 (CODE 443)

RP-14339 (Code 443) has been used as an accelerator in the rubber industry for many years. A number of years ago, it was observed that employees manufacturing this compound experienced severe reactions following the consumption of alcoholic beverages. The reactions took the form of headaches, marked flushing of the skin, palpitation of the heart, and nausea.

Perhaps stimulated by these observations in industrial employees, investigations were started with a similar compound a number of years ago by medical research personnel in its use to treat alcoholism. This research resulted in the development of the drug Antabuse for this problem.

The physiological mechanism by which the effects of discomfort and the more serious symptoms following the consumption of alcohol occur are not completely known, but it is believed to be the result of the production of acetaldehyde in the body. Because of the severity of these reactions, the use of the drug Antabuse is carefully controlled, and although it has not proven to be the cureall for alcoholism, it does have some value in some individuals.

The systemic toxicity of ~~RP-14339 (Code 443)~~ ^{RP-14339 (Code 443)} is somewhat ^{higher} ~~lower~~ than that of Antabuse. In the manufacture and use of both of the compounds, moderate precautions need to be taken to prevent systemic effects, apart from any responses to alcohol, from occurring. The principal type of injury that may result with overexposure is liver damage.

In the use of RP-14339 (Code 443) employees should be forewarned about the effects from alcohol, and medical personnel should also be aware of these peculiar responses so that prompt treatment of any severe reactions can be made.

The above is adapted from an article in the April, 1968, Safety Newsletter, Rubber & Plastics Section, National Safety Council.

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Cancels None

C. COMMON INDUSTRIAL HAZARDS

RP-12328 & RP-12862

No Threshold Limit Value has been established for this chemical.

Both of these materials produce large quantities of airborne dust when mixed on open mills. It is extremely difficult, if not impossible, to ventilate a mill well enough to keep the air concentration at a satisfactory level.

Excessive exposure to RP-12328 or RP-12862 has caused nosebleed and sore throat. For that reason, if dust is not controlled by ventilation, dust respirators should be required.



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Date 5-3-68
Cancels None

C. COMMON INDUSTRIAL HAZARDS

LEAD AND LEAD COMPOUNDS (OTHER THAN TETRAETHYL LEAD)

GENERAL

Lead and its compounds are toxic. Taken into the body in excessive amounts, lead and lead compounds cause a serious form of poisoning (intoxication) which is one of the oldest industrial diseases known. The most probable cause of lead intoxication in industry is from excessive quantities taken into the body by inhalation over a prolonged period of time.

The Threshold Limit Value of lead is 0.2 mg per cubic meter of air. This is a very small air concentration.

PREVENTION

The prevention of lead intoxication is relatively simple. The principal means used are:

1. Adequate local exhaust ventilation where lead or lead compounds ~~can~~ could become airborne.
2. Prevention of ingestion of lead from food and tobacco which have become contaminated in the workplace or by inadequate cleansing of the hands prior to eating or using tobacco.
3. Good housekeeping.

There are two principal means by which lead exposures are measured to determine whether the preventative measures are adequate:

1. Periodic air sampling for lead.
2. Periodic examination of blood for lead.

It is relatively simple to determine whether harmful quantities of lead have been absorbed. This is done by a chemical determination of the concentration of lead in the blood. Specialized sampling equipment and a sophisticated analytical technique are necessary, but this test is the best means for the determination of absorbed lead.

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MAY 21 1968

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INDUSTRIAL HYGIENIST



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C. COMMON INDUSTRIAL HAZARDS

LEAD AND LEAD COMPOUNDS (continued)

INHALATION

The most probable (and most hazardous) route for entry of lead is via inhalation into the lungs and its subsequent transport throughout the body by the circulating blood.

Metallic lead, when heated sufficiently, gives off a fume of very small particle size which is readily inhaled. Molten lead is easily oxidized at its surface; when it is skimmed, stirred, poured, or otherwise agitated in the presence of air, variable quantities of finely divided lead oxide may be thrown into the air.

Dusts of finely divided lead and many lead compounds become airborne readily despite their high specific gravity.

Cutting, welding, and reshaping of metal surfaces coated with lead-bearing paints generate airborne lead. Lead burning may also cause a hazardous condition.

Lead compounds are also thrown into the atmosphere within droplets of mist and when lead-bearing paints, enamels, and glazes are sprayed.

INGESTION

Lead that contaminates the hands, food, tobacco, or other objects taken into the mouth may not be ignored as a source of exposure.

Where lead and lead compounds are handled, the following precautions should be observed:

1. Keep food, beverages, and all forms of tobacco out of the workplace.
2. Wash hands thoroughly prior to eating and before using tobacco in any form.



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Date 5-3-68

Cancels None

C. COMMON INDUSTRIAL HAZARDS

LEAD AND LEAD COMPOUNDS (continued)

+ + + SKIN CONTACT + + +

Lead and inorganic lead compounds are not skin irritants, nor are they absorbed through the skin in significant quantities. Certain other compounds of lead, such as salts of fatty acids and complex organic acids, have been regarded with distrust and apprehension from the aspect of skin absorption; while definitive information is incomplete, the preponderance of evidence is that these compounds are not absorbed through the skin in potentially dangerous quantities.

- - - HOUSEKEEPING - - -

Good housekeeping is essential in order to prevent lead and lead compounds from becoming scattered about. Once scattered about, they can more easily become airborne.

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G. L. WILSON
INDUSTRIAL HYGIENIST

TRICHLOROETHYLENE & TETRACHLOROETHYLENE (PERCHLOROETHYLENE)GENERAL

These are chlorinated hydrocarbons which have moderate inhalation toxicity. They are commonly used in metal degreasers. See "Solvent Degreasers" in this section of Manual.

INHALATION

The Threshold Limit Value of both is 100 ppm. Exposure to high concentrations causes irritation of the nose and throat. There may be nausea and gastrointestinal upset, as well as dizziness. Severe acute overexposures have caused deaths. Chronic overexposure to low concentrations may cause liver or kidney injury, but not as serious as that caused by carbon tetrachloride.

~~FIRST AID~~

If patient is unconscious, call a physician at once. While waiting for a physician: Carry patient to fresh air. If breathing is stopped, carefully apply artificial respiration. Preserve patient's body heat by over and under wrapping with blankets. If the clothes are wet with solvent, remove them and apply olive oil to patient's skin, removing the oil as soon as convenient with soap and warm water.

If conscious, patient should ~~be~~ not be allowed to walk. Use stretcher to carry patient to hospital. If patient is taken home, he should be taken by car, put to bed, and a physician called. (This also applies to persons who have been sufficiently exposed to be unsteady on their feet, sleepy, dozey, or excessively fatigued.)

~~VENTILATION~~

Use with adequate ventilation. Local exhaust ventilation for degreasers is sometimes required.

SKIN CONTACT

Repeated and prolonged exposure causes drying and defatting. The skin may become reddened. Prevent skin contact. Use neoprene gloves as appropriate. Remove from skin with soap and water.

EYE CONTACT

~~XXXXXXXXXXXX~~ Prevent contact. Irritates the eyes. Causes a burning sensation. Not likely to cause injury if removed promptly. In case of contact, hold eyelids open and wash immediately with a gentle stream of water for at least 15 minutes, preferably at an eye fountain. Get medical attention.

INGESTION

(APPROX ONE FOURTH OF AN OUNCE)
Harmful or fatal if swallowed. Five ml has caused death. Affects liver and ~~KIDNEY~~ kidneys. ~~Induce vomiting and get medical attention~~
induce vomiting ~~Call a physician at once, and then follow the procedure promptly.~~ outlined above for ~~inhalation~~ *inhalation*.

FIRE HAZARD

Non-flammable, except that under certain conditions, trichloroethylene vapor has been known to explode when the vapor concentration is as high as 90% in air, ~~and the temperature is elevated.~~ This phenomenon is rare.

If involved in a fire, chlorine, hydrochloric acid and other highly toxic decomposition products are produced.

DRAFT

Sharon: Hald

March 17, 1970

RP-10424

RP-10424 contains several percent of a chemical which is a skin irritant and sensitizer, and which is not physiologically inert if inhaled.

The following precautions should be observed:

1. Prevent skin contact.
2. Avoid prolonged breathing of vapor or dust.
3. Exhaust ventilation to prevent inhalation should be used where dust may become airborne.

Repeated skin contact may not cause difficulty until after sensitization occurs. Once sensitized, ~~XXX~~ the affected individual may develop a rash following the slightest skin contact, and may have to be medically restricted from all further contact with RP-10424.

Trouble is more likely to arise during hot, humid weather. *Therefore*

At elevated temperatures RP-10424 may generate heat by polymerization or condensation. The reaction begins at temperatures below the fusion point, which is about 194°F. Practically, this should not be a problem in normal handling and storage. If the material has been exposed to fusion temperatures in the drum, it could burn spontaneously.

GLW:ss

March 4, 1970

SOLVENT DEGREASERSGENERAL

Deaths continue from improper operation or improper operating practices involving solvent degreasers. Trichloroethylene and perchloroethylene (tetrachloroethylene) are commonly used degreaser solvents. Procedures and safeguards supplied by equipment manufacturers must be followed for safe and efficient degreaser operation. See ~~See this section of MANUAL~~ "Trichloroethylene + tetrachloroethylene" in this section of MANUAL.

REQUIRED PROVISIONS

To insure safe degreasing, the following must be a part of the original installation:

1. Trichloroethylene and perchloroethylene degreasers must be equipped with condensing coils of water or refrigeration type with sufficient capacity to absorb the heat input. For optimum efficiency, the water outlet temperature from the coil should be maintained between 100-110°F. A thermostatic control valve on the water outlet is recommended. Where water supply or water disposal facilities are a problem, it is suggested that a cooling tower be used to provide water of the proper temperature.
2. All degreasers must be equipped with a thermostat in the boiling solvent to regulate heat input and prevent overheating.

3. Trichloroethylene and perchloroethylene degreasers must be provided with a high vapor level control (safety thermostat).
4. Spray pumps, if provided, must be electrically interlocked with a vapor level control to insure that the solvent is at proper temperature before use. This control must be installed in the free-board zone just above the normal ~~XXXX~~ vapor level, and should be of the manual reset type. Under no circumstances is this control to be used to regulate the vapor level within the degreaser.
5. Racks or baskets must be of open, lightweight construction, and no larger than necessary.
6. Electric hoists are essential for heavy work to insure a controlled rate of entry and removal of the cleaning load. Hoisting speed must not exceed 10-12 feet per minute.

Under certain circumstances, an exhaust ventilation system may be required to maintain solvent vapor concentrations within the Threshold Limit Value ^{100 PPM} in the working environment. This is particularly true where cross-drafts cannot be controlled or agitation is required for parts cleaning.

DEGREASER FAULTS

~~Other common faults with degreaser operations include the following:~~

1. Hand-Operated Degreasers

- a. The use of solid metal parts baskets with insufficient openings in the bottom to drain the solvent.
- b. Baskets which fit tightly into the degreaser causing solvent vapor to be expelled to the atmosphere by displacement.
- c. Overloading the degreaser to exceed the pound per hour capacity specified by the manufacturer. This procedure lowers the vapor level rapidly and has a tendency to pull room air into the degreaser, creating a solvent-air mixture. Unless the parts being degreased are left in the tank for an extended time period the solvent condensed on them will not have evaporated sufficiently before they leave the degreaser.
- d. A poor racking system for parts which have indentations where liquid solvent can be trapped. Parts with hollows or depressions must not be randomly racked but must be placed in a position to drain the liquid while in the confines of the degreaser. This not only saves solvent and reduces solvent exposure to employees, but achieves a cleaner part.

- e. Mechanical hoisting devices which (usually) operate at twice the recommended speed of 10-12 feet per minute. When excessive lifting speeds are used, the hoist must be stopped with the parts basket or rack at the top of the vapor level to allow all liquid to drain and evaporate before removal.

2. Conveyorized Degreasers

- a. Faulty controls (any of the above) which prevent proper degreaser operation.
- b. Excessive conveyor speed. This drags air into the degreaser inlet and draws solvent out of the unit.
- c. A "chimney effect" where inlet and outlet openings are at different heights. This causes a convective flow of air through the degreaser, carrying solvent out through upper openings.

3. All Degreasers

- a. While rare, there have been cases of solvent substitution, i.e., use of trichloroethylene in a machine designed for use with perchloroethylene. Due to the widely differing physical characteristics of these solvents, such substitution can safely be made only after a complete overhaul of the machine and its controls.

- b. Dirty solvent. This results in poor degreasing and will produce a disagreeable odor.
- c. Air currents near open doors or in drafty areas. This will likely siphon solvent vapors from the degreaser into the workroom. Solvent lost into the air serves no useful purpose and is dangerous. This loss exposes employees to excessive solvent vapor. It increases cleaning costs. ~~and~~ It may result in severe corrosion to the space heating equipment or nearby combustion equipment.

DEGREASER MAINTENANCE

A degreaser must be cleaned regularly to avoid sludge build-up. Safety equipment and caution must be employed when cleaning a degreaser. If a unit must be entered for cleaning, it should be done only after all the solvent liquid and vapors have been removed or dissipated, and then only when at least one other workman is present on the outside. The person descending into the degreaser must have a "lifeline" attached to him by means of a safety harness. This should be coupled with adequate outside means with which to quickly haul the worker to safety. A chemical cartridge respirator approved by the U. S. Bureau of Mines must be worn by the man inside.

GLW:ss

FIRST AID

Inhalation

If patient is unconscious, call a physician at once. While waiting for a physician: Carry patient to fresh air. If breathing ~~X~~ has stopped, carefully apply artificial respiration. Preserve patient's body heat by over and under wrapping with blankets. If the clothes are wet with solvent, remove them and apply olive oil to patient's skin, removing the oil as soon as convenient with soap and ~~WATER~~ warm water.

If conscious, patient should not be allowed to walk. Use a stretcher to carry patient to hospital. If patient is taken home, he should be taken by car, put to bed, and a physician called. (This also applies to persons who have been sufficiently exposed to be unsteady on their feet, sleepy, dopey, or excessively fatigued.)

Eye Contact

Prevent eye contact. Causes a burning sensation. Not likely to cause injury if removed promptly. In case of contact, hold eyelids open and wash immediately with a gentle stream of water for at least 15 minutes, preferably at an eye fountain. Get medical attention.

Ingestion

Induce vomiting. Call a physician at once, then follow the procedure outlined above for inhalation.

Fire Hazard

Non-flammable under ordinary conditions. High concentrations of solvent have been known to explode when the vapor concentration is as high as 90% in air, and the temperature is elevated.

March 9, 1970

PHENOL (CARBOLIC ACID)

Phenol and its solutions are used as laboratory chemicals and as raw materials. Refer to Manufacturing Chemists' Association Chemical Safety Data Sheet SD-4 for a detailed discussion.

Phenol is rapidly absorbed through the intact skin to produce toxic effects. Death within minutes has been caused by contact with a relatively small skin area. The extent of absorption depends more on the skin area exposed than on the concentration of the solution.

SKIN CONTACT

Immediate action is imperative in case of contact, as follows:

1. Instantly flood ~~the~~ affected area with water; an emergency shower is preferable.
2. Remove contaminated clothing while under the shower.
Undeeling & do not use caps. → DO NOT DELAY USE OF WATER TO REMOVE CLOTHING. Continue washing until all odor of phenol has disappeared.
3. Get medical attention immediately.

Contact causes corrosive burns unless removal is prompt. Use rubber gloves to prevent contact. When handling large quantities, such as drums or tank cars, headgear and impervious clothing ^{NEOPRENE} ~~such~~ ₁ ~~as neoprene~~ are desirable.

EYE CONTACT

Corrosive. Contact is likely to cause injury. Wear chemical goggles when handling. Full length face shields may be worn in addition to goggles when complete face protection is desirable. In case of contact, hold eyelids open and wash immediately with a gentle stream of water for at least 15 minutes, preferably at an eye fountain. Get medical attention immediately.

INHALATION

Excessive inhalation of vapor is hazardous. It may cause respiratory difficulties, lung damage and affect the kidneys.

The Threshold Limit Value is 5 ppm.

FIRE HAZARD

Flash point is 185°F (TOC). Lower explosive limit is approximately 1.5% by volume in air.

GLW:ss

Safety

1



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Part	1. FACTORY SAFETY MANUAL	Date Cancels	9-11-62 None

A. DISTRIBUTION OF MANUAL

The Factory Safety Manual is published by the Safety Department; all plants were supplied with copies of the manual in 1960. Should additional copies be required contact the Home Office Safety Department

B. TABLE OF CONTENTS OF THE FACTORY SAFETY MANUAL

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II. Purpose Of These Standards

The purpose of this procedure is to give ways to:

- A. Guard against the improper use of dangerous materials now in use at the plant level.
- B. Insure adequate handling and protective measures for new chemicals introduced as raw materials at the time of their introduction into production.
- C. Control exposures to products of the chemical reaction of two or more raw materials.
- D. Guard against the use of raw materials for purposes other than those specified.
- E. Arrange for proper storage of materials which may be affected by heat, humidity, or temperature extremes.
- F. See that the method of disposal of dangerous materials does not create a fire or safety hazard.

III. Procedure

- A. When there is a possibility of any of the conditions noted in Part II existing, the question shall be called to the attention of the Plant Safety Engineer by the Chief Chemist (or the Development Head) of the plant. This does not preclude the matter being raised by some other division, such as the production division, the engineering division, or the purchasing division. (If it is possible to do so, the question of the safe use of any new material or process should be raised while in the planning or experimental stage so as to prevent excessive delay when the material or process is to be put into production. Such a procedure will not only save time but also money, and is highly desirable.
- B. To ascertain the hazard involved, the Plant Safety Engineer will consult with the Chief Chemist and will also check with the Plant Medical Department, the Plant Fire Chief, and the Plant Purchasing Department Head. The latter can often find from the supplier of the material or equipment

5-4273-M

The Firestone Tire & Rubber Company



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INTERPLANT RELEASE NO. 10-10 (Continued)

some idea of the hazard involved and the necessity for control. Consideration should always be given to the possible substitution of less hazardous materials or processes for the ones contemplated, before control measures are considered.

- C. Should the knowledge gained at the plant level be insufficient to ascertain the extent of the hazard or the means of control, the Plant Safety Engineer shall directly, or through the Plant Industrial Relations Division, contact the Home Office Safety Department. This department in turn will discuss the matter with such other Home Office departments as the Medical Department, Engineering Department, Development Department and Fire Department, so as to be able to advise the plant concerned with the problem.
- D. Once a procedure has been established and approved for safeguarding the use of a hazardous material or process, it shall be the Plant Safety Engineer's responsibility, in cooperation with the management of the department involved, to see that the proper controls are put into effect and that all personnel involved are properly informed of the necessary safe practices to be followed. Written copies of the procedure should be supplied to all interested plant departments. The adequate labeling of hazardous material, while in the plant, should be a part of this procedure.
- E. A copy of all written procedures, as established under Item "D", shall be sent to the Home Office Safety and Medical Departments so that such information may be passed on to other plants where the hazardous condition may exist at the present or at some future time.
- F. When the question raised has to do with health of the user of a product manufactured by us, the matter may be referred directly to the Home Office Medical Department which has an established procedure for ascertaining the answer to such questions.



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B. HAZARDOUS MATERIALS

SAFE HANDLING OF HAZARDOUS MATERIALS

Quoted below is Mr. J. V. Cairns letter dated May 1, 1962, on this subject:

"Greater emphasis must be placed on our procedures for handling all materials, some of which may present serious hazards. In order that these procedures will be clearly understood and definite responsibilities assigned, we are revising the previous instructions for the safe handling of hazardous materials. You should see that the parties concerned in your plant are made aware of this procedure and its contents. Copies are being sent to Chief Chemists, Plant Engineers, and Safety Engineers

Its basic function and purpose is to provide a workable method that entails a minimum amount of delay which insures the safety of all employees.

The procedure entitled "Safe Handling of Hazardous Materials," dated May 1, 1962, supersedes "Safety, Health, and Fire Control of Raw Materials," issued by Mr. J. A. Meek, dated October 7, 1957."

The purpose of this release is to place directly in the hands of each Plant Engineer for his close observance, the attached copy of instructions on "Safe Handling of Hazardous Materials" consisting of two pages, dated May 1, 1962.

For record purposes, we are informed copies of these instructions have been sent to your Plant Manager, Chief Chemist and Safety Engineer. Please give your full cooperation in complying with these instructions.



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SAFE HANDLING OF HAZARDOUS MATERIALS

I. Introduction

The introduction of new materials and manufacturing operations into our plants make it mandatory to exercise careful and continuing control over the materials and processes which may be a source of danger to the health and safety of our employees.

II. Purpose

- A. To guard against the improper use of hazardous materials now in use at the plant level.
- B. To insure adequate handling and protective measures for new chemicals introduced into production.
- C. To control exposures to chemical reactions of these raw materials.
- D. To arrange for proper storage of materials which may be affected by heat, humidity, or temperature.
- E. To establish a method of disposal of hazardous materials so as not to create a fire or safety hazard.
- F. To guard against the use of raw materials for purposes other than those specified.

III. Procedure

- A. The question of the safe use of any new materials or process shall be raised while in the planning or experimental stage and shall be reported to the Home Office Industrial Hygiene Department by the Chief Chemist, if new materials are involved, or the Chief Engineer, if process is involved. This will prevent excessive delay when the material or process is to be put into production. Consideration should always be given to the possible substitution of less hazardous materials or processes for the ones contemplated, before control measures are considered.



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SAFE HANDLING OF HAZARDOUS MATERIALS (Continued)

In order for the Industrial Hygiene Department to make a sound judgment about potential hazards and to outline proper means for their control, the following information on new materials, including those for research and development, is required:

1. Flash point and fire point.
2. All available toxicological data, particularly that on inhalation, skin and eye contact.
3. The chemical identification.
4. Handling and storage precautions.
5. Special medical procedures recommended in case of exposure.
6. A detailed explanation of how the material is to be used, including mention of any elevated temperature involved.

The supplier should supply the information in 1 through 5; not all of it will be applicable to all materials. In this event, the answer may be "none," particularly for items 1 and 5. If the supplier is reluctant to divulge the chemical identification to plant personnel he may send it directly to the Industrial Hygiene Department. In this case the chemical identification is kept confidential if requested, and is marked as such when filed.

- B. When question raised has to do with health of the consumer of a product manufactured by us, the Chief Chemist shall refer the matter directly to the Home Office Medical Department which has an established procedure for ascertaining the answer to such questions.
- C. When hazardous materials are to be introduced into production in a plant, these steps are to be followed:
 1. The fact shall be called to the attention of the Plant Safety Engineer by the Chief Chemist of the plant. This does not preclude the matter being raised by some other division, such as Development, Production, Engineering, or Purchasing.
 2. To ascertain the hazard involved, the Plant Safety Engineer will consult the Chief Chemist, the Plant Medical Department, the Plant Fire Chief, and the Plant Purchasing Department Manager.



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SAFE HANDLING OF HAZARDOUS MATERIALS (Continued)

The latter can often find from the supplier of the material or equipment some idea of the hazard involved and the necessity for control.

3. Should the knowledge gained at the plant level be insufficient to ascertain the extent of the hazard or the means of control, the Plant Safety Engineer shall, directly or through the Plant Industrial Relations Division, contact the Home Office Safety Department.

IV. Enforcement of Procedure

- A. Once a procedure has been established and approved for the safe handling of a hazardous material or process, it shall be the Plant Safety Engineer's responsibility, in cooperation with the management of the department involved to:
 1. See that the proper controls are put into effect and maintained and that all personnel involved are properly informed of the necessary safe practices.
 2. Supply written copies of the procedure to all interested plant departments.
 3. Label adequately all hazardous material, while in the plant.

V. Approvals

A copy of all written procedures, as previously outlined, shall be sent to both Home Office Safety and Medical Departments for approval. This will tend to establish and standardize similar procedures throughout our company. It will prevent unnecessary duplication of effort. It will promote a freer interchange of information.

VI. Special Problems

Materials and processes found by the Home Office to require special handling will be listed under separate cover. Application instructions will indicate for each pigment the necessary safety precautions required.

REV
10-24-66

C. L. WILSON
SAFETY ENGINEER



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B. HAZARDOUS MATERIALS

TEFLON

The use of TEFLON for gaskets, compressor rings, packing and coatings, pipe seals, machine parts, and products material is becoming more widespread in industry. Sheet stock, bar stock, tape, and other forms of TEFLON are used for machine parts and occasionally it is used as a dry lubricant.

The following information has been received and is sent to you for your use to instruct your personnel in the safe procedure of handling TEFLON as indicated:

TEFLON is harmless unless exposed to extreme temperatures of 450° or higher. TEFLON, when unheated, may be taken in with food or drink without ill effect. TEFLON RESINS are non-toxic except when exposed to the high temperatures as stated.

Fumes from any resins, paints, solvents, and elastomers, as well as naturally occurring polymers like rubber, coal, silk, and wood may be toxic. Therefore, the ventilation precautions to be observed when heating TEFLON RESINS are the same as those that should be observed when heating other such conventional materials. Ventilation is necessary and important as is a proper coolant when machining TEFLON.

The ATTACHED RULES are felt to be adequate for the present operations; however, should a greater volume of work develop the need for an isolated shop area with proper exhaust equipment may become necessary.

FIRESTONE SAFETY RULES FOR THE HANDLING OF TEFLON PRODUCTS

The following rules provide adequate protection for working personnel and shall be obeyed.

1. DO NOT HAVE OPEN CIGARETTES, CIGARS, OR PIPE TOBACCO ON PERSON OR IN THE AREA WHILE GRINDING, FILING, SAWING, MACHINING, WELDING, BURNING, OR CUTTING TEFLON BY TORCH.
2. DO NOT SMOKE OR PERMIT SMOKING IN AREA WHERE TEFLON IS BEING FILED, GROUND, SAWED, MACHINED, WELDED, BURNED OR CUT BY TORCH.
3. NATURAL VENTILATION IS ADEQUATE FOR MOST GRINDING & MACHINING OPERATIONS: HOWEVER, WHEN WELDING OR CUTTING TEFLON-COATED PARTS, MECHANICAL VENTILATION SHOULD BE PROVIDED.



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Cancel: None

FIRESTONE SAFETY RULES FOR THE HANDLING OF TEFLON PRODUCTS--CONTINUED

4. MAINTAIN A CLEAN WORK AREA BY REMOVING TEFLON DUST OR PARTICLES FROM WORK SITE IMMEDIATELY AFTER COMPLETION OF JOB.
5. BE SURE CLOTHES ARE FREE OF TEFLON DUST OR PARTICLES BEFORE LEAVING WORK AREA.
6. WASH HANDS AND REMOVE DUST FROM CLOTHING BEFORE SMOKING AFTER FILING, GRINDING, SAWING, OR MACHINING TEFLON.
7. ALL SCRAP TEFLON AND TEFLON-COATED MATERIALS MUST BE ACCUMULATED IN A COVERED METAL CONTAINER; CONTAINER TO BE PAINTED YELLOW AND MARKED IN LARGE LETTERS "SCRAP TEFLON ONLY -- DO NOT BURN."
8. WHEN SCRAP CONTAINER IS FULL, THE COVER MUST BE TIGHTLY SECURED TO THE DRUM.
9. THE DRUM OF SCRAP TEFLON WILL THEN BE REMOVED TO THE TRASH COLLECTION AREA. THE CONTRACTING TRASH COLLECTOR WILL DISPOSE OF THE COVERED SCRAP DRUM AS A UNIT.
10. A NEWLY PAINTED AND LETTERED DRUM MUST BE AVAILABLE AND USED WHEN A DRUM FILLED WITH TEFLON SCRAP IS SENT TO THE TRASH AREA.



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			Cancel	None

C. BAGOMATICS AND AUTOFORM PRESSES

PROCEDURE IN CASE OF POWER FAILURE

When a power failure occurs there are 3 objectives -

1. Save the tires in the presses.
2. Prevent injury to personnel.
3. Prevent damage to the equipment.

To accomplish these the following procedure should be followed:-

I. Safety Features

Considerable planning has gone into this phase of the operation and Bagomatic and autoform installations have the following features:-

- (a) Pressure Switches to prevent presses opening with pressure in bladders or domes.
- (b) An automatic emergency instrument air valve in the main factory air line which closes, shutting off all air to the factory when the pressure drops to 65 lbs. and conserves it for instrument air only.
- (c) A Deisel generator is provided to supply emergency power so that a limited number of presses can be opened.
- (d) Steam driven hot and cold internal water pressure pumps are provided which can be started when the electricity goes off.
- (e) A Deisel or steam driven instrument air-compressor is provided to supply instrument air if the main compressors stop.



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PROCEDURE IN CASE OF POWER FAILURE (CONTINUED)

II. What Happens When Power Fails

- (a) Electric driven hot and cold water pressure pumps stop.
- (b) Hot water circulating pumps stop.
- (c) Timers on presses stop.
- (d) Power to open presses ceases.
- (e) In case of a prolonged power failure and inability to get the emergency air-compressor started, the presses will all blow down if the air-pressure gets down to 30 P. S. I. This is the worst thing that can happen because many tires will be scrapped.
- (f) Because the hot water circulating pumps are electric driven, the tires will be undercured if the internal hot water period on each press is not lengthened to compensate for lack of circulation.
- (g) If presses are opened with insufficient internal cooling and blowdown, the bladders may swell and burst.

III. What To Do When The Power Fails

- (a) In the case of a momentary failure where the power is off a few seconds and then comes back on, first restart all the electric driven pumps.

This is usually all that is necessary because the timers automatically resume running and go thru the normal cure and will open automatically.

- (b) In case of a longer power failure, do the following:-
 - (1) Note the time the power ceases.



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PROCEDURE IN CASE OF POWER FAILURE (CONTINUED)-

III. What To Do When The Power Fails (Continued)

(b) (Continued)

- (2) Start the steam driven hot and cold water pressure pumps.
- (3) Start the Deisel Generator and the Emergency Air-Compressor if they are not the type that start automatically.
- (4) Stop laying tires even though the emergency power permits presses to be opened. This power is intended only to save the tires in the presses.
- (5) Follow the presses and if they are on the hot water internal portion of the cure, stop the timer and allow additional time to compensate for the fact that the water circulating pumps are not running. The Laboratory man should be there to tell you how much time to add.
- (6) Continue to follow the presses and put them on internal cold water at the proper time. This usually means only turning the timer switch back on; however, if you have lost the emergency power, also, this can be done either by manually turning the cam shaft in the timer or by latching up the internal hot water timer valves and unlatching the internal cold water timer valve. In such cases leave them on cold water until you have power to open the presses. Then give them the normal blow down and open them.



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PROCEDURE IN CASE OF POWER FAILURE (CONTINUED)

III. What To Do When The Power Fails (Continued)

(b) (Continued)

It is important that all presses receive the proper internal cooling water time before opening because even though the pressure may have been blown down sufficiently to open the press, there still may be some hot water remaining in the bladder and the clamping rings in a Bagomatic or the well in an autoform would still be hot and when the bladder elongates in a B. O. M. or is pushed into the well in a N. A. F., this water strikes the hot metal parts and flashes into steam which causes the bladders to swell and even burst.

IV. Advance Precautions

- (a) Sometimes you have warning of a power failure as, for example, the threat of a work stoppage at the power company or, perhaps, there is a severe electrical storm in the area. In such cases, put the steam driven pumps in operation in advance and be ready to start the Deisel Generator and the Emergency Compressor on short notice.
- (b) Pressure switches on all presses should be checked every 6 months.
- (c) Emergency Instrument Air Valve should be checked periodically.
- (d) Deisel Generator and Emergency Air Compressor should be started once per week and operated for 5 minutes to insure that they are in satisfactory operating condition.



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			Cancel	None

A. COMPRESSED AIR EQUIPMENT

PRIOR RELEASE NO. 35

SUGGESTED OPERATING SAFEGUARDS FOR COMPRESSED AIR EQUIPMENT

A. GENERAL

1. All equipment should be designed to withstand the maximum pressure that might be required when in operation.
2. Equipment should be installed at a location where the air intake to the compressor will be as clean, pure and cool as possible. Keep it away from areas where flammable and/or explosive dusts, vapors and gas fumes are heavy.
3. All equipment should be located where it can be thoroughly and conveniently serviced and inspected. Always allow sufficient clearance between bottom of air receiver tank and floor, so as to permit proper inspection and maintenance.
4. Follow the recommendations of the manufacturer for installation and operation, including lubrication.

B. AIR RECEIVER TANK

1. For required maximum pressure, tank should be built to Section 8 of A. S. M. E. Code, or such other code that was jurisdiction in the area where tank is located.
2. Tank must be provided with a drain valve or cock at the bottom. Arrange to drain daily, so as to remove moisture as fast as it condenses.
3. Keep tank painted and clean, as a means of preventing corrosion on external surfaces.

C. PROTECTIVE DEVICES

1. Automatic start-stop equipment should have safety guards on all exposed moving parts.
2. Test regulator manually at least every day. Test safety valve to determine if it is in correct operating condition, and clear of any dirt that might have lodged in valve, or its opening.

S-4273-M

The Firestone Tire & Rubber Company

SUBJECT TO DISCLOSURE RESTRICTION

40801



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PRIOR RELEASE NO. 35 (Continued)

SUGGESTED OPERATING SAFEGUARDS FOR COMPRESSED AIR EQUIPMENT

3. Never place a valve between the compressor and receiver.

Dr. L. H. Ballou
Medical Bldg.

NO. _____
DATE _____
ISSUED _____
ISSUED BY _____

TO: ADMIN. DIV. OF ADMINISTRATION
MANUALS & PLANT ENGINEER'S MANUALS

INTEREST READING

SUBJECT: PAINTING STANDARDS

The 1965 Direct ne Printing Standards, which are in your manual, lists "Thru" Stacks as a use for 100% Silver-White High-Temp Resisting Aluminum paint. This is in error, as this aluminum is not an exterior paint.

The 100% Silver-White High-Temp Resisting Aluminum paint can be used at a temperature of 400° F. or higher. The 100% Silver-White paint can be used.

Please note this for future references.

G. L. WILSON
INDUSTRIAL HYGIENIST

NOTE:

1. 100% Silver-White
2. 100% Silver-White
3. 100% Silver-White
4. 100% Silver-White

RECEIVED

JUN 28 1965

G. L. WILSON
INDUSTRIAL HYGIENIST

RECEIVED

JUN 16 1965

DR. L. H. BALLOU

1
- Physical Control -
copy of book



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PAINTING STANDARDS

New painting standards and specifications have been approved for immediate adaptation on all Firestone properties (effective February 1, 1965). The listed paint and types are in reference to one manufacturer's color codes, and it is recommended, where possible, to use their products. Some minor variations may be necessary, due to availability of these specific paints in your area, therefore, substitute local manufacturer's products may be used. However, in no way should the general color scheme be changed. Likewise, the quality of materials should not be lowered.

The Janitor Service is to be scheduled on the basis that equipment and facilities will be repainted every four (4) years. During the interim period, a scheduled cleaning program is also to be effective in order to maintain equipment and facilities in a neat and orderly condition. Touch-up painting is to be done when and where required.



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Part		2. MACHINERY	Date Cancels	11-7-62 None

A. MECHANICAL HAZARDS

PIERCE TIRE WRAPPING MACHINE

We just have word Hamilton experienced a mechanical failure on their tire wrapping machine. While no personnel injury occurred it is evident a serious hazard exists and precautions should be taken.

Machine involved was only recently equipped with wide gap shuttle. Following is quoted from Hamilton letter 2-4-58 to Pierce Wrapping Machine Company:

"The three screws that fasten the paper roll holder attachment to the side of the wide cap shuttle assembly sheared off while the machine was in operation. The paper roll and the holder attachment were thrown out of the machine, narrowly missing the operator.

"An examination of the screws that failed revealed that they are porous and impregnated with a plastic material for approximately 1/2" from the end.

"We are sending under separate cover the top portion of one of the sheared off screws, along with a lower portion which had to be drilled out so that it could be removed from the shuttle.

"If you will examine this with a light and glass you can easily see the holes filled with plastic material, especially in the side of the lower portion. The holes and plastic material may have been intentionally inserted during the manufacture of the screws, designed to act as some sort of screw lock, or the screws may have been made from contaminated material, however, all three screws sheared off flush with the surface of the shuttle.



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MACHINERY			

A. MECHANICAL HAZARDS

DeMATTIA TUBE CURING STANDS - SAFETY HAZARD CORRECTION

Following is report of accident which recently occurred on DeMattia Tube Curing Stand in one of our plants:

"The operator's right hand was trapped between the two halves of mold due to the top half, which is mechanically lifted, suddenly falling. He sustained fractures on all fingers and bones of hand, also lacerations and 3rd degree burns.

"Upon a full Engineering investigation, it was discovered the accident was caused through the retaining nut on the piston shaft becoming loose and finally detaching itself allowing the piston, which operates the top half of the mold to become inoperative so that it was impossible to life the top mold except by external force.

"The safety catch at the back of the mold was in good condition, and it would appear that he had laid a green tube and was not satisfied, so opened the mold by means of the safety pet cock, and attempted to take the tube away before the mold had fully opened and allowed the safety to engage; and at that moment the nut came away, with the results described. The nut and thread on shaft were in good condition."



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			Cancels	None

A. MECHANICAL HAZARDS

DeMATTIA TUBE CURING STANDS - SAFETY HAZARD CORRECTION

Subsequent to Interplant Release IP.10-6, dated 10-30-58, we have received from Brentford information on Safety Bar which they have added to their DeMattia Stands.

We attach photostat of their print BB-9128 and by way of explanation we add their comment to the effect that the "Tee-bar at the extreme end of the operating handle can contact the projecting pin 4-3/4" long fixed on the side of the safety ratchet. This enables the ratchet to be disengaged by operation of the hand lever. "

This information is passed on to you for your use as you see fit. In the interest of overcoming all potential safety hazards we believe you will be interested in taking advantage of this if your present stands do not have some similar safety device.



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			Cancels	None

C. SPECIFIC HAZARDOUS EQUIPMENT

POWDER ACTUATED HAND TOOLS

We quote below a Safety News letter issued 11/21/62 by Mr. M. R. Batche to Safety Engineers in all Firestone plants. This additional release is being made to give broad coverage on this subject and to clarify information issued in the past so that it definitely will be understood that the Safety Department does not approve the use of powder actuated tools by Firestone employees or by employees of outside contractors working within Firestone property.

This matter should be investigated at once in each plant and the use of such tools eliminated if any are found in existence.

We quote below:

"On November 10, 1962, one of our employees, an electrician in an overseas plant, was using a powder gun to drive screw nails to hold clamps for electrical wire in a 1/4 X 1 1/4 angle.

After driving two of them, the third hit the ream of the angle and made its way up to a five-inch cast iron pipe where it split in two and rebounded.



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D. POINT-OF-OPERATION HAZARDS

SAFETY PROCEDURE - MC NEIL SHEAR STRIP TIRE PRESSES

In recent years we have had several serious accidents where McNeil Shear Strip Tire Presses opened with pressure in the bag, in the dome, or both. The causes of all of these accidents has not been definitely determined, but we feel some of them were caused by pushing the electric contactor in order to open the press and thus stop an overcured tire.

To prevent accidents of this type, all plants should advise their supervision, operators, and maintenance personnel of the following procedure concerning these presses:

1. Check at least monthly all the safety devices on the presses. There are three safety devices; (1) the internal pressure switch, (2) the dome steam pressure switch, and (3) the strain gauge safety. If these safeties are all operating, the press cannot be opened when there is any pressure inside of it unless someone takes a stick and pushes the open contactor in manually. This by-passes all the safeties, and should never be done.
2. At the termination of a cure when a press will not open and the red light is on indicating there is pressure inside the press, turn off all the services to the press. Red tag the press and put a note with the red tag indicating that there is pressure inside.
3. The press should be left until it can be operated by using the normal push button provided on the front of the press. This means that all safeties indicate no internal pressure.

If every plant follows this procedure diligently, we should be able to eliminate this type of accident.



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D. POINT-OF-OPERATION HAZARDS

As a result of this accident, a meeting was held in Akron to determine the necessary action to avoid accidents of this type in the future. This meeting was attended by representatives of International, Production, Development and Engineering.

Action decided on is listed below:

1. It is mandatory that the drum rotation, during the tread stitching operation, shall be so that the top of the building drum is rotating towards the builder. This applies to all tire assembly machines.
2. The Engineering, Production and Development Departments must work in close cooperation to be certain that there is no adverse effect on the quality of the tread splice on those machines that require reversing the drum rotation.
3. Attached are Mr. S. W. Hoffmann's instructions for making tread splices, when the tread is applied from the builder's side of the drum.
4. Each plant shall write a report to Interplant not later than thirty (30) days after receiving this release advising the following:
 - a. Direction of drum rotation of each tire assembly machine during the tread stitching operation.
 - b. Side of drum from which tread is applied, on each machine.
 - c. When tread is applied from builder's side of drum is method "A" or "B" used as outlined in Mr. Hoffmann's instructions.
 - d. Give details on any production or quality problems that result from this release.



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D. POINT-OF-OPERATION HAZARDS

DRUM ROTATION DIRECTION-METHOD OF MAKING TREAD SPLICES (Continued)

Method 'A' has been used by our Memphis Plant with Management's permission for several years on the basis that hand stitching operation is closely controlled. Adjustment records prove that with this control the quality level is excellent and Memphis have had an excellent OTS record.

Each plant will be responsible for setting up their own program-- they should advise Akron. They will also be responsible for setting up the proper controls, and for watching the OTS adjustment record.

Recognizing that introduction of tread trays offer in many cases major problems from the standpoint of cost, design, space, etc., we know that tread trays offer the additional advantages of maintaining cleanliness, freedom from contamination and uniform application; hence, are to be considered for each plant's long range program of building more precise and higher quality level tires.

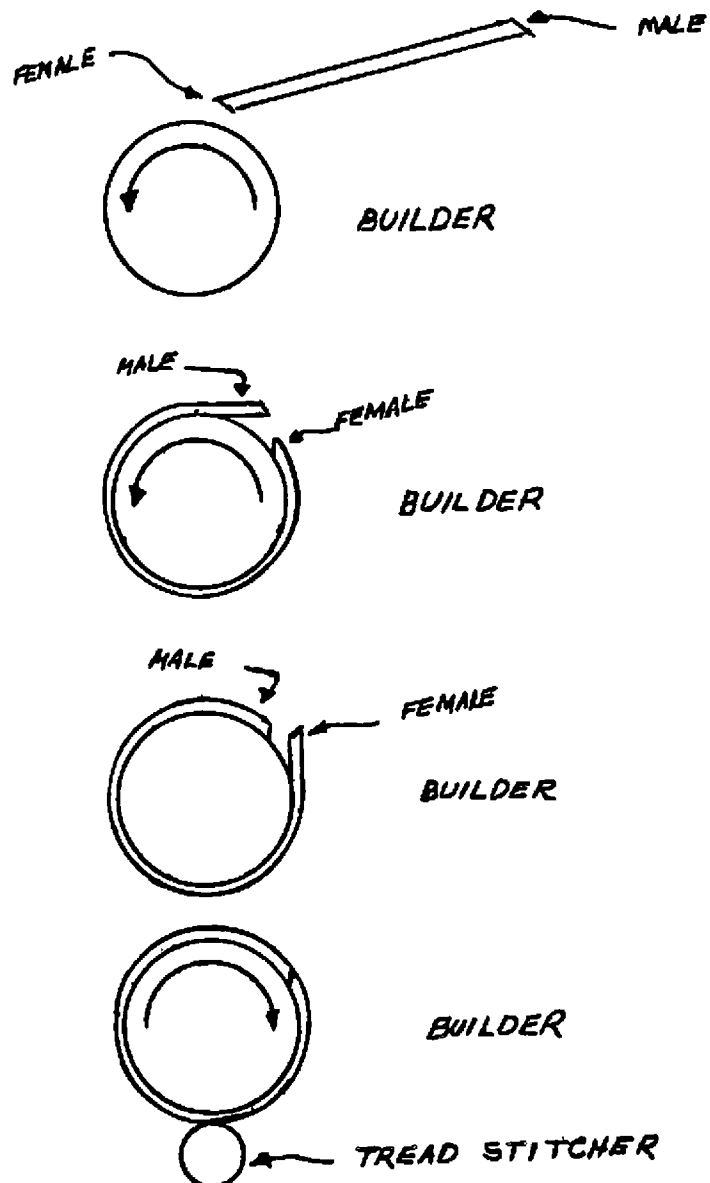


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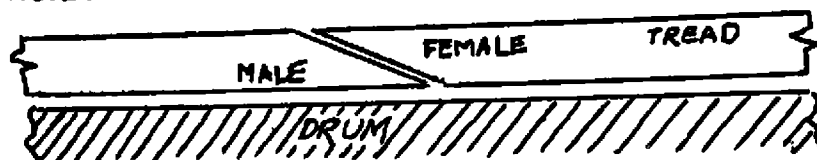
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METHOD B



NOTE:



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		Cancel	None

E. AUTOMATION

CURING ROOM ACCIDENT - B. O. M. SHAPING

One of our plants recently had an accident on a 40" bagomatic press caused by excessive steam pressure entering the bladders during the shaping operation, resulting in bladders and tires bursting. Fortunately, the area was cleared of personnel and no injury occurred.

Engineering Laboratory have reviewed the report on this accident and at their request we attach copy of R. C. Davis letter of 1/16/61, outlining steps which should be taken to safeguard against such an accident.

CURING ROOM ACCIDENT - B. O. M. SHAPING - PLANT REPORT 1-5-61

The instance of the runaway high steam pressure in the shaping steam supply header (normal 35 psi) indicates what can happen when controls fail. In this instance, an air operated diaphragm steam valve opened wide due to air failure in the controlled air line to it. The steam safety pop valve in the header was too small to hold the pressure down to within a few pounds of its set point. Steam rushed into the bladder of the Bag-O-Matic press so fast and expanded the tires so rapidly the operator no doubt became panicky and failed to push the shaping control valve button on the press, which would have stopped shaping. The tires and bladders burst with explosive force. Luckily no one was hurt.

We would like you to send a copy of their letter to all tire plants, domestic and foreign, and emphasize that the following steps should be taken to safeguard against such an accident:



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A. ELECTRIC HAZARDS

BAGOMATIC TIRE PRESS - SAFETY

A number of very serious accidents have occurred at the bagomatic tire curing stands when the presses opened up unexpectedly during the curing period while the hot water was still under pressure inside of the bladder. Such action results in an explosion of the bladder and tire with damage to the press and serious burning and injuries to any personnel present in the area.

The false opening of the presses has been found to be caused by grounding faults or short circuits in the wiring system involving a bypass of the safety pressure switches. The electrical circuit design has been reviewed with the McNeil Machinery & Engineering Company and they have revised the design to eliminate this obvious weakness. They are changing the wiring on all future presses so that the available voltage at the opening-contactor-coil will be reduced by the resistance of a series pilot lamp to a value too small for operation of the contactor.

The wiring changes requires for this purpose as shown by red markings on the following prints:

Pratteln Plant - Bagomatic Press 230-40" Wiring Diagram A-33729-1
Christchurch Plant - Bagomatic Press 230-40" Wiring Diagram A-33729-1
Phoenix Plant - Bagomatic Press 275-45" Wiring Diagram A-33542

In order to obtain satisfactory operation of the pressure switch contacts, it will also be necessary to change the wiring at the No. BZ-3YST micro switches as shown on the diagram so that the hot line and the ground line connections are positioned one directly above the other and not on diagonally opposite contacts.

By means of the above minor changes in wiring, we can remove the serious hazard that now exists and it is imperative that all plants take immediate action to make this change on their presses.



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STORAGE OF MATERIALS AND CHEMICALS			

A. RUBBER PRODUCTS

PRIOR RELEASE NO. 3

RUBBER INDUSTRY NATION WIDE STANDARDS FOR STORAGE OF RUBBER PRODUCTS

FORWARD

Rubber products are readily combustible and fires in them are difficult to extinguish because of the intense heat and the heavy smoke which are produced. Many large scale fire tests have been made with protection from automatic sprinklers. These tests were made with different piling methods and height of piles. The most common method of piling is to place tires horizontally one on another.

Tests have shown that fires may be controlled by systems employing either conventional or spray type sprinklers. Final extinguishment may be accomplished by hose streams and probably by removing from the piles involved, all tires in which fire is well established. It is recommended that suitable and adequate fixed automatic fire protection be provided, and also that the building and the tire storage be arranged so that hose stream protection may be used.

1. WAREHOUSES

Fire resistive construction is preferred, especially if the building is more than one story in height. Noncombustible or mill construction is acceptable. Walls should be of masonry or at least of noncombustible construction. Floors and roof should not be of open wood joist or other light wood construction. If a multi-stored building is used, all floor openings should have standard cutoffs. It is desirable to provide some means of venting smoke and toxic vapors which are produced by the burning of rubber products. The maximum area per building or fire division should be kept to reasonable limits considering the various factors of construction, tire piling arrangements, and values which may be exposed to a single fire, but should not exceed 100,000 sq. ft. of net storage space.

2. TIRE PILING

Pile height should not exceed 20 feet in sprinklered buildings, and 10 feet in unsprinklered buildings. The area per pile should not exceed 8,000 sq. ft. The main unbroken aisle extending the full length or width of the fire area should be at least 8 ft. wide, and cross aisles should have a minimum



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A.	<u>RUBBER PRODUCTS</u>		

PRIOR RELEASE NO. 3 (Continued)

18 ft.	. 48 gpm/sq. ft.	. 40 gpm/sq. ft.
20 ft.	. 60 gpm/sq. ft.	. 48 gpm/sq. ft.

4. WATER SUPPLIES

Water supplies should be adequate to immediately supply the conventional or spray sprinklers on the basis indicated above. They should also be capable of supplying 500 gpm at adequate pressure to hose streams. The water supplies should be able to continue meeting these demands for at least one hour.

5. SMALL HOSE PROTECTION

Small hose protection should consist of not less than one 1-1/2 inch hose line with approved hose and nozzle for each 10,000 sq. ft. of floor area. In addition to the hand hose there should be provided in sprinklered buildings one hand extinguisher unit for each 5,000 sq. ft. of warehouse area and in unsprinklered buildings one extinguisher unit for each 2,500 sq. ft. of warehouse area.

6. WATCH AND ALARM SERVICE

Watch and alarm protection should consist of recorded rounds and waterflow devices on all sprinkler risers; or approval central station supervisory service may be employed, supplemented in special cases by human supervision.

7. GENERAL PROTECTION

General protection should include ample outside hydrant protection, standpipes with hose outlets in cutoff stair towers in multi-storied buildings, ample supply of extinguishers, excellent housekeeping and enforcement of NO SMOKING regulations.

8. PRIVATE FIRE BRIGADE

A private fire brigade should be well organized and drilled and provided with an ample supply of smoke masks.

NOTE: It is important that both the Private Fire Brigade and the Public Fire Department fully understand the importance of beginning the application of hose streams early in the fire while it is possible to approach it closely and before smoke accumulates to such an extent that the location of the fire cannot be exactly determined.

S-4273-M

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		Cancels	None

A. RUBBER PRODUCTS

PRIOR RELEASE NO. 21

P. BORDA
E. H. HUNNICUTT
J. C. BLUE
A. J. DIMAGGIO
J. H. FORMAN
W. C. RANKIN
J. S. GIEGEL
R. L. BROWN
G. J. PENFIELD

M. E. AKE, JR.
G. L. ANDERSON
J. MATTINSON
J. TELLERIA
A. H. FINNEY
R. L. NOYES
C. W. CAMPBELL
A. C. KOENIG
C. A. HILL

P. F. KRANS
H. H. WIEDENMANN
R. W. ELSASS

SPECIFICATIONS AND PROCEDURE FOR THE STORAGE OF CRUDE AND SYNTHETIC RUBBER

We quote following from Mr. H. Field's (Insurance Dept.) May 4 letter:-

"We attach herewith, copy of a recently revised bulletin "Specifications and Procedure for the Storage of Crude and Synthetic Rubber." This revised manuscript is the result of a joint and careful study made by our Rubber Purchasing Department, Traffic Department and Insurance Department of the problem of storage of these high valued materials.

"It is our recommendation that copies of this manuscript be forwarded to each of our plants and subsidiaries who store and handle crude and synthetic rubber."

"Questions concerning the numerous points set forth in the manuscript should be directed to the Home Office Insurance Department, who will then contact the other departments involved for an answer."

We attach copies of Specifications and Procedure for Storage of Crude and Synthetic Rubber.



ADMINISTRATION MANUAL

HEALTH, SAFETY ENGINEERING & PROPERTY PROTECTION

Section	X	ACCIDENT PRODUCING PHYSICAL CONDITIONS AND THEIR CONTROL	VOLUME	I
			Page	10.4. A. 7
Part	4.	STORAGE OF MATERIALS AND CHEMICALS	Date	11-7-62
			Cancels	None

A. RUBBER PRODUCTS

Weight

Smoked Sheets	250 lbs. gross each
Smoked Crepe	260 lbs. gross each
Crepe Rubber	224 lbs. gross each
	110 lbs. gross each

- c. Bags, Balls, Cases, Wild Rubbers (Varioud Coverings)
- | |
|-------------------------|
| Bags - 50 to 100 lbs. |
| Balls - 80 to 150 lbs. |
| Cases - 400 to 500 lbs. |

- d. Synthetic Rubber (various coverings) 72-74 lbs.

3. Specifications for storage of rubber:

The following specifications are the result of many years of experience in the storage of crude and synthetic rubber and are also designed to meet insurance requirements. They in no way relieve the warehouseman of his responsibility in following good warehouse practices.

- a. Small fire areas are preferred for the storage of these materials wherever available. The larger the area used for storage, the greater the opportunity for fire loss. Buildings having small areas or sub-divided into small units by fire walls and fire resistive floors should be utilized in preference to large undivided areas.
- b. The management of warehouses used for storage of these materials will be held responsible for the proper maintenance of the building and its equipment, for the provision of adequate watchman service and other features of guarding where specified, for the enforcement of the prohibition of smoking, for the elimination of combustible waste materials, and for any other potential sources of the start and spread of fire and for proper practices in the piling of materials.
- c. All outside openings in buildings shall be maintained secure against the access of unauthorized persons. Fire walls and floors shall be maintained in good repair at all times to restrict the spread of fire from any area where it may originate.



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		Cancels	None

A. RUBBER PRODUCTS

- j. Fire Resistive Walls. The minimum recognized standard for fire-resistive walls shall be 2-in. cement plaster, metal-lath, metal frame partitions.
- k. Maximum Height and Size of Piles. In no case shall the rubber be piled higher than 10 ft. (Due allowance should also be made for safe floor loading.) Clearance between top of piles and sprinkler heads shall be not less than 18 in. and preferably 3 ft. Storage piles should not exceed 2500 sq. ft. in floor area, and should be separated from other piles by at least a 5 ft. cross aisle. Main trucking aisles should be limited to not less than 10 ft. in width.
- l. Cleanliness. Floors shall be thoroughly cleaned of combustible waste, oxidizing oils, and any other hazardous waste materials.
- m. Electrical Equipment shall be safely arranged. Particular attention shall be given to switches, junction boxes, extension cords, and other equipment capable of producing an arc or short circuit.
- n. Other Storages. Crude and synthetic rubber storage should be separated from other combustible storage as far as practicable.



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Part	4.	STORAGE OF MATERIALS AND CHEMICALS	Date	11-7-62
			Cancels	None

A. RUBBER PRODUCTS

- p. Rubber must be kept perfectly dry at all times.
If there is any question of the absorption of moisture by rubber from floors, side walls, pipes and the like, warehousemen must take necessary precautions to prevent damage to rubber from absorption of moisture.
- q. Frequent ventilation of premises in fair weather is required.
- r. Dry dunnage at least two inches in thickness must be used on any floors which show even the slightest tendency to dampness.
- s. Rubber must be stored by grade marks appearing on packages.

OUTSIDE STORAGE

- a. Value of individuals piles should be limited to \$50,000.
This value of crude rubber at current market values could be stored in piles approximately 22 x 30 x 15 ft. high.
Pyramided piles require greater areas.
- b. Storage piles in groups should have individual piles at least 30 ft. apart and preferably 50 ft. apart. The limit for each such group should be \$500,000.
- c. Groups of \$500,000 value should be separated by 100-ft. aisles or more.
- d. Water supplies, hydrants, and hose should be such that six to eight hose streams are available to combat a fire in any individual pile and to protect adjoining piles.



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Section	X	ACCIDENT PRODUCING PHYSICAL CONDITIONS AND THEIR CONTROL	VOLUME Page	II 10.5.A.1
Part	5	MATERIAL HANDLING	Date Cancels	8-25-65 NONE

A - POWER TRUCKS

SUBJECT: SAFETY WARNING LIGHTS FOR IN-PLANT VEHICLES

REASON: To equip all in-plant rider type power vehicles with standard flashing warning lights. Vehicles include platform and fork lift tractors, utility vehicles such as sweepers, power driven welder units and personnel carriers.

LOCATION OF INFORMATION: Information on this recommendation is contained in detail in the Plant Engineers Manual - Volume II - Section VII Safety Engineering, Part 2 Safety Standards, C Material Handling, page 7.2.C.1. This information was issued as an Interplant Release No. IP 10-30, 2 pages, dated 8-10-65.

RECEIVED

SEP 7 1965

G. L. WILSON
INDUSTRIAL HYGIENIST

S-4273-M

The Firestone Tire & Rubber Company

SUBJECT TO DISCLOSURE RESTRICTION

40822

Explosive and
Flammable Material

ADMINISTRATION MANUAL

HEALTH, SAFETY ENGINEERING & PROPERTY PROTECTION

Section XI EXPLOSIVE AND FLAMMABLE MATERIALS

VOLUME	I
Page	11. 2. 1

Part 2. PROPERTIES OF FLAMMABLE MATERIALS

Date	10-29-62
Cancels	None

PROPERTIES OF FLAMMABLE LIQUIDS, GASES, AND SOLIDS

NAME	SYNONYMS	FORMULA	Flash Point °F.		Explosive Limits % by Vol. in Air		Specific Gravity (Water = 1.0)	Vapor Density (Air = 1.0)	Boiling Point °F.
			Closed Cup	Open Cup	Lower	Upper			
Acetal	1,1-Diethoxyethane	CH ₃ CH(OC ₂ H ₅) ₂	-5	1.85	0.821	4.08	218		
Acetaldehyde	Ethyl Acetyl Aldehyde	CH ₃ CHO	-20	4.0	0.783	1.52	70		
Acetic Acid	Acetic Acid	CH ₃ COOH	249	1.21	4.65	891			
Acetic Anhydride	Ethanoic Acid	CH ₃ COOH	104	1.10	1.05	2.07	248		
	Acetyl Oxide	(CH ₃ CO) ₂ O	121	1.30	3.67	3.52	284		
Acetone	2-Propanone	CH ₃ COCH ₃	0	15	2.16	13.0	134		
Acetyl Acetone	Diethylketone	CH ₃ COCH ₂ CH ₂ COCH ₃	174	180	0.792	3.94	378		
Acetylacetone	2,5-Hexanedione	CH ₃ COCH ₂ CH ₂ COCH ₃	221	193	0.873	4.14	365		
Acetylacetone	Phenylmethyl Ketone	CH ₃ COCH ₂ Ph	330	268	0.812	3.14	218		
Acetylacetone	Acetyl-p-Toluidine	CH ₃ COCH ₂ NHCOCH ₃	13	108	0.975	3.48	285		
Acetylacetone	2,4-Pentanedione	CH ₃ COCH ₂ CH ₂ COCH ₃	...	...	...	...	...		
Acetyl Chloride	Ethanoic Chloride	CH ₃ COCl	40	...	1.105	2.70	124		
Acetylene	Ethyne; Ethine	C ₂ H ₂	gas	113	1.16	0.91	-119		
Acetyl Formate	Propenal Acrylic Aldehyde	CH ₃ CH(OC ₂ H ₃)CHO	...	...	0.84	1.94	128		
Acrolein	Propenal	CH ₃ CH=CHO	...	...	1.062	...	285		
Acrylic Acid	Propenoic Acid	CH ₂ =CHCOOH	...	...	...	...	...		
Acrylonitrile	Propenenitrile	CH ₂ =CHCN	...	33	5.06	17.8	0.800	1.83	171
Adipic Acid	Hexanedioic Acid	COOH(CH ₂) ₄ COOH	325	141	1.11	3.04	360		
Alkal	2-Hydroxybutanal	CH ₃ CH(OH)CHO	70	75	3.0	19	0.854	2.00	206
Allyl Alcohol	2-Propen-1-ol	CH ₂ =CHCH ₂ OH	-25	-20	3.28	11.15	0.937	2.64	113
Allyl Chloride	3-Chloropropene	CH ₂ =CHCH ₂ Cl	...	...	...	...	...	...	...
Allylene	Propyne	CH ₃ CCH	gas	...	1.74	...	1.38	-19	
Aluminum (Powder)	Al	Al	...	166	...	...	0.944	...	382
2-Amino-1-Butanol	Hydroxyethyl-Ethylamine	NH ₂ CH ₂ CH ₂ NHCH ₂ CH ₂ OH	280	275	...	...	1.030	2.80	469.4
2-Aminothioethanamine	Ethylthioamine	NH ₂ CH ₂ CH ₂ NHCH ₂ CH ₂ SH	...	...	16.0	28.0	0.887	...	-37
Anisic Acid (Anhydrous)	...	...	...	...	...	...	...	...	...
Amyl Acetate-n	1-Pentanol acetate	CH ₃ COOC ₅ H ₁₁	78	80	1.1	...	0.870	4.40	360
Amyl Acetate-iso	3-Methyl-1-butanol acetate	CH ₃ COOC ₅ H ₁₁	77	100	1.06	...	0.870	4.49	200
Amyl Acetate-sec	2-Methyl-2-butanol acetate	CH ₃ COOC ₅ H ₁₁	88	111	0.805	...	0.871	4.48	249
Amyl Alcohol-n	1-Pentanol; Fusal Oil	CH ₃ (CH ₂) ₄ OH	91	120	1.5	...	0.817	8.04	250
Amyl Alcohol-iso	3-Methyl-1-butanol	(CH ₃) ₂ CHCH ₂ CH ₂ OH	109	115	1.5	...	0.813	3.04	270
Amyl Alcohol-sec	2-Methyl-2-butanol	(CH ₃) ₂ CHCH ₂ CH ₂ OH	94	102	...	...	0.810	3.04	265
Amyl Alcohol-tert	2-Methyl-2-butanol	(CH ₃) ₂ CHCH ₂ CH ₂ OH	103	103	...	...	0.810	3.04	235
Amyl Alcohol-Ter	2-Methyl-2-butanol	(CH ₃) ₂ CHCH ₂ CH ₂ OH	87	78	...	...	0.803	3.03	218
Amylamine, Mon	1-Aminopentane	C ₅ H ₁₁ NH ₂	...	48	...	...	0.776	3.01	215-231
Amyl Benzenesulfonate	1-Chloropentane	C ₅ H ₁₁ Cl	...	150	...	...	0.78-0.84	8.11	365
Amyl Chloride	1-Chloropentane	C ₅ H ₁₁ Cl	...	85	1.4	...	0.874	3.87	223
Amyl Chloride, Mized	Proprietythylene	C ₅ H ₁₁ Cl	...	30	1.8	7.70	0.846	2.42	185-228
Amylene-n	Diamyl Ether	CH ₃ (CH ₂) ₄ OCH ₃	...	135	...	...	0.78-0.80	5.46	320-330
Amyl Mercaptan (mized)	...	...	...	85	...	...	0.83-0.84	3.59	223-257
Amyl Naphthalene	...	...	...	225	...	...	0.873	8.88	340
Amyl Phenol-n	...	...	...	210	...	...	0.86-0.87	8.60	349
Amyl Propionate	...	...	...	100	...	...	0.869-0.873	8.0	278-287
Amyl Salicylate	...	...	270	...	1.083	...	7.17	512	
Amyl Stearate	...	...	...	365	...	...	0.860	...	338-350
Amyl Sulfinate (mized)	...	...	...	185	...	...	0.86-0.91	...	400-418
Amyl Toluene	...	...	...	180	...	...	0.867	...	480-500
Amyl Xylol Ether	...	...	...	365	...	...	1.022	3.22	383
Aniline	Aminobenzene	C ₆ H ₅ NH ₂	168	...	1.022	...	...	...	...
Aniline Hydrochloride	Aniline Chloride	C ₆ H ₅ NH ₂ ·HCl	280	280	0.88	...	1.22	4.49	472
Anthracene	Para-Naphthalene; Green Oil	C ₁₄ H ₁₀	365	365	0.88	...	1.28	8.18	844
Anthracenone	...	C ₁₄ H ₈ O	...	...	1.138	...	7.16	716	...
Aromatic Pitch	...	...	400-4	525+	0.85-1.1	...	...	>700	...
Artificial Almond Oil	...	C ₁₀ H ₁₆ O	148	165	1.05	...	3.86	335	...
Benadoline	Amphetamine	C ₉ H ₉ N	...	>80	0.931	...	...	...	302
Benamine	Benzoic Acid	C ₆ H ₅ COOH	119	...	0.88	...	3.77	178	...
Benamine	Benzoic Acid	C ₆ H ₅ COOH	...	<0	0.84	...	4.2	100-180	...
Benamine	Benzoic Acid	C ₆ H ₅ COOH	240	...	1.299	...	4.21	482	...
Benamine Chloride	Benzoic Carbonyl Chloride	C ₆ H ₅ COCl	215	...	1.212	...	4.86	587	...
Benzoic Acid	...	...	...	...	...	...	...	...	...
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Benzoic Chloride	...	...	...						



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Date 10-29-62
Cancel None

NAME	SYNONYMS	FORMULA	Flash Point °F.		Explosive Limits % by Vol. in Air		Specific Gravity (Water = 1.00)	Vapor Density (Air = 1.00)	Boiling Point °F.
			Closed Cup	Open Cup	Lower	Upper			
Cyclohexanone	Ketohexamethylene	C ₆ H ₁₀ O	147	...	1.1 @ 31°F.	...	0.947	...	313
Cyclohexanone delta	...	C ₆ H ₁₀ O	83	...	...	...	...	3.31	...
Cyclohexyl Acetate	Hexalene Acetate	CH ₃ COOC ₆ H ₁₁	128	...	...	...	0.905	4.30	350
Cyclohexylamine	Aminocyclohexane	C ₆ H ₁₁ NH ₂	...	90	...	...	0.965	3.42	...
Cyclopentane	Pentamethylene	C ₅ H ₁₀	...	...	...	...	0.731	...	120.7
Cyclopentane p-Cymene	Trimethylene 4-isopropyl-1- methylbenzene	C ₁₀ H ₁₆	654	...	2.41 0.7 @ 31°F.	10.3	...	1.48	-59
Dacryhydronaphthalene	Dacryl	CH ₂ C ₆ H ₄ CH(CH ₃)O	117	148	...	...	0.94	4.72	534
Dacryl	Dacryl	CH ₂ C ₆ H ₄ CH(CH ₃)O	117	148	...	...	0.905	4.72	534
Denatured Alcohol—95%	Denat. Hydrate	C ₂ H ₅ OH	119	...	0.67	8.6	0.793	4.00	364
Denatured Alcohol	Denatured ethanol	C ₂ H ₅ OH	119	...	...	...	0.82	1.80	176
Diacetone (acetone free)	4-Hydroxy-4-methyl- pentanone-2	CH ₃ COCH ₂ C(CH ₃) ₂ COCH ₃	136	146	...	...	0.83-0.84	...	326
Diacetone (room T.)	Diacetone Alcohol	CH ₃ COCH ₂ C(CH ₃) ₂ COCH ₃	46	85	...	...	0.931	4.00	328
Diampiline	N-n-amyamine	(C ₆ H ₅) ₂ NH	124	>158	...	...	0.777	5.42	396
Diampiline	...	C ₁₂ H ₁₆ N ₂	...	118	...	...	0.77-0.78	...	302
Diaryl Naphthalene	...	C ₁₀ H ₆ (C ₆ H ₅) ₂	...	318	...	...	0.87-0.94	9.28	624
Diaryl Phenol-2, 4	...	C ₁₀ H ₆ (C ₆ H ₅) ₂	...	300	...	...	0.87-0.94	9.28	577
Di-4-arylmethylene Ethanol	...	C ₁₀ H ₆ (C ₆ H ₅) ₂	...	300	...	...	0.908	9.4	618
Diaryl Phthalate	...	C ₁₀ H ₆ (C ₆ H ₅) ₂	265	...	...	...	1.023	...	648
Diaryl Phthalate-n	...	C ₁₀ H ₆ (C ₆ H ₅) ₂	245	340	...	...	...	...	474-490
Diaryl Benlate	...	(C ₆ H ₅) ₂	...	185	...	...	0.89-0.89	9.02	338-354
Diastiline	Di-para-aminodi- methoxydiphenyl	(NH ₂ OC ₆ H ₄) ₂	403	...	...	...	1.076	6.82	553
Dibenzyl Ether	...	(C ₆ H ₅ CH ₂) ₂ O	275	...	...	...	0.838	...	350-370
Dibenzylmethane	...	(C ₆ H ₅ CH ₂) ₂	140	...	...	...	...	...	...
Dibutylamine	Di-n-butylamine	(C ₄ H ₉) ₂ NH	...	135	...	...	0.78	4.46	322
Dichlorobenzene	1,2-Dichlorobenzene	C ₆ H ₄ Cl ₂	...	200	...	...	0.95	5.97	332
Dichloro Ethyl-n	1-Dichloroethane	C ₂ H ₄ Cl ₂	77	...	...	...	0.789	4.48	296
Dichloro Oxalate-n	...	C ₂ H ₄ Cl ₂	230	...	...	...	1.01	...	...
Dichloro Phthalate-n	...	C ₈ H ₆ Cl ₂	...	335	...	...	1.048	9.58	600
Dibutyl Phthalate-lao	...	C ₁₈ H ₂₆ O ₄	322	...	...	...	0.963	9.68	660
Dibutyl Sebacate	...	C ₂₂ H ₄₂ O ₄	...	363	...	...	...	...	...
Dibutyl Tetrastate-n	...	C ₂₂ H ₄₂ O ₄	...	363	...	...	1.00	9.03	660
Di-2-chlorobenzene	1,4-Dichlorobenzene	C ₆ H ₄ Cl ₂	181	185	...	...	1.325	5.07	354
Di-2-chlorobenzene	1,4-Dichlorobenzene	C ₆ H ₄ Cl ₂	181	185	...	...	1.458	5.07	354
Di-2-chlorobenzene-2	...	C ₆ H ₄ Cl ₂	80	85	...	...	...	4.31	248
Dichloromethane	Freon F-12	CH ₂ Cl ₂	...	...	...	...	1.200	9.31	...
Dichloroethylene 1, 1	Dichloroethene 1, 1	CH ₂ Cl ₂	87	...	...	...	...	...	...



ADMINISTRATION MANUAL

HEALTH, SAFETY ENGINEERING & PROPERTY PROTECTION

Section XI EXPLOSIVE AND FLAMMABLE MATERIALS

VOLUME 1

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Part 2. PROPERTIES OF FLAMMABLE MATERIALS

Date 10-29-62

Cancel None

PROPERTIES OF FLAMMABLE LIQUIDS, GASES, AND SOLIDS—(Continued)

NAME	SYNONYMS	FORMULA	Flash Point °F.		Explosive Limits % by Vol. in Air		Specific Gravity (Water = 1.00)	Vapor Density (Air = 1.00)	Boiling Point °F.
			Closed Cup	Open Cup	Lower	Upper			
Formaldehyde	Formal	CH_2O	140	155	2.1	13.5	1.198	2.31	322
Formyl Alcohol	Formyl Carbinal	$\text{CH}_2\text{OCH}_2\text{OH}$	167	...	...	...	1.129	3.37	340
Gas, Blast Furnace	...	...	...	...	...	...	...	...	...
Gas, Coal Gas	...	...	...	...	...	...	...	...	...
Gas, Illuminating	...	...	...	...	...	...	...	...	...
Gas, Natural	...	...	...	...	...	...	...	...	...
Gas, Oil Gas	...	...	...	...	...	...	...	...	...
Gas, Producer	...	...	...	...	...	...	...	...	...
Gas, Water	...	...	...	...	...	...	...	...	...
Gas, Oil	...	...	160+	...	...	...	...	...	...
Glycerine	Glycerol	$\text{HOCH}_2\text{CH}(\text{OH})\text{CH}_2\text{OH}$	-80	290	1.3	8	1.26	3-4	100-400
Glycerol Triacetate	Triacetin	$(\text{CH}_3)_3\text{COCCH}_2\text{O}$	230	235	...	...	1.161	3.12	354
Glycol Diacetate	Ethylene Acetate	$\text{CH}_3\text{COOCH}_2\text{CH}_2\text{OCH}_3$	220	225	...	...	1.100	6.03	370
Glycol Diformate	Ethylene Formate	$\text{HCOOCH}_2\text{CH}_2\text{OCH}_3$	...	200	...	...	1.227	4.07	360
Heptadecanol	Heptadecyl Alcohol	$\text{C}_{17}\text{H}_{35}\text{OH}$	...	310	...	...	0.847	8.84	560
Heptane-n	...	$\text{CH}_3(\text{CH}_2)_6\text{CH}_3$	28	...	...	...	0.68	3.43	208
Heptane-is	...	...	<0	...	1	6	0.725	3.45	178-190
Heptanol-2	...	$\text{CH}_3(\text{CH}_2)_4\text{CH}(\text{OH})\text{CH}_2\text{CH}_3$	...	160	...	...	0.818	4.01	330
Hexane-n	...	$\text{CH}_3(\text{CH}_2)_5\text{CH}_3$	-7	...	1.35	6.9	0.661	2.97	156
Hexane-is	...	...	<-30	...	1	7	0.685	3.0	130
Hexyl Acetate	Methyl Amyl Acetate	$\text{CH}_3\text{COOCH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$	113	...	...	...	0.82	4.97	285
Hexyl Alcohol	...	$\text{CH}_3(\text{CH}_2)_5\text{CH}_2\text{OH}$	145	...	...	...	0.818	3.83	275
Hexyl Alcohol	Ethylbutyl Alcohol	$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$	137	...	...	...	0.822	4.07	285
Hexylene Glycol	...	$\text{CH}_2\text{OCH}_2\text{CH}_2\text{OCH}_2\text{CH}_2\text{OCH}_3$	...	265	...	...	0.794	8.43	460
Hexyl Ether	Dibutyl Ether	$\text{CH}_3(\text{OC}_4\text{H}_9)_2$	...	170	...	...	...	...	...
Hydrocyanic Acid	Prussic Acid	HCN	0	...	5.5	40	0.697	0.933	79
Hydrazine	...	$\text{H}_2\text{N}-\text{NH}_2$	...	...	4.1	74.2	...	0.089	-122
Hydrogen Sulfide	...	H_2S	...	...	4.3	45.5	...	1.18	-78
Hydroquinone	p-Hydroxybenzene	$\text{C}_6\text{H}_4(\text{OH})_2$	...	...	...	...	1.222	3.81	945
Hydrazine	Oxammonium	NH_2OH	...	...	...	...	1.227	...	168
Indocene	...	...	...	...	...	...	...	...	...
Indolene	...	...	...	...	...	...	1.064	...	340
Isobutane	2-Methylpropane	$(\text{CH}_3)_3\text{CH}$	170	...	1.5	8.1	0.5968	2.08	10
Isobutylene	...	...	...	...	...	...	0.590	...	18.5
Isobutyraldehyde	2-Methylbutanal	$(\text{CH}_3)_2\text{CHCH}_2\text{CHO}$	-40	...	...	...	0.813	...	145
Isoprene	...	$\text{CH}_2=\text{C}(\text{CH}_3)\text{CH}=\text{CH}_2$	-63.3	...	...	...	0.679	2.35	93
Isopropylamine	Monoisopropylamine	$(\text{CH}_3)_2\text{CHNH}_2$	...	-35	...	...	0.68	...	80
Kerosene	No. 1 Fuel Oil	...	110-165	...	1.16	6.9	<1	4.5	...
Leaded Spirit	...	...	...	...	...	...	<1	...	...
Lamp Oil	...	...	...	...	...	...	<1	...	...
Lead Oil (commercial)	Wool Grease	...	395	...	...	...	<1	...	...
Lead Oil (pure)	...	...	...	...	...	...	...	...	...
Lead Tetraethyl	...	...	...	...	...	...	...	...	...
Linseed Oil	...	...	...	...	...	...	...	...	...
Lubricating Oil, Mineral	Paraffin Oil, includes motor oil	...	...	...	...	...	...	...	...
Magnesium (Powder or Chips)	...	...	...	...	...	...	...	...	...
Maleic Anhydride	cis-Butenedioic Anhydride	$\text{C}_4\text{H}_2\text{O}_3$	219	240	...	...	1.208	2.88	2048
Manganese (Powder)	...	...	...	...	...	...	...	...	...
Menthadon Oil	Pearl Oil	...	455	...	...	...	0.927	...	3450
2-Mercaptoethanol	2-Hydroxyethyl mercaptan	$\text{HSCH}_2\text{CH}_2\text{OH}$	...	165	...	...	1.110	2.70	315
Methyl Dactyl	4-Methyl-3-penten-2-one	$(\text{CH}_3)_2\text{C}(\text{CH}_3)\text{CH}=\text{CHCOCH}_3$	57	125	...	...	0.838	3.40	280
Metalddehyde	m-Acetaldehyde	$(\text{CH}_3)_2\text{C}(\text{OH})_2$	97	125	...	...	...	8.08	...
Methane	Marsh Gas	CH_4	...	...	5.2	12.9	...	0.554	-96
Methoxy Ethyl Phthalate	Methox	...	...	375	...	...	...	...	...
Methoxyethyl Acetate	Triethylene Glycol Methyl Ether Acetate	$\text{CH}_3\text{OCH}_2\text{CH}_2\text{OCH}_2\text{CH}_2\text{OCH}_2\text{CH}_2\text{OCH}_3$	...	380	...	...	1.084	7.11	380
Methyl Acetate	...	$\text{CH}_3\text{COOCH}_3$	15	20	4.1	12.9	0.925	3.88	140
Methyl Acetoacetate	...	$\text{CH}_3\text{COCH}_2\text{COOCH}_3$	100	...	...	...	1.077	4.00	330
Methyl Acetone (Mixture)	...	...	...	...	...	...	...	...	...
Methyl Alcohol	Methanol	CH_3OH	54	60	6.0	36.5	0.792	1.11	147
Methylamine, mono	Aminomethane	CH_3NH_2	0	...	...	...	0.699	...	10
Methylamine-30% sol'n	...	...	...	...	...	...	...	...	...
Methyl Amyl Ketone	Heptanone-2	$\text{CH}_3(\text{CH}_2)_4\text{COCH}_3$	...	120	...	...	0.816	3.94	305
Methyl Bromide	Bromomethane	CH_3Br	...	...	12.5	16.8	1.732	3.27	40
2-Methyl Butadiene-1,3	...	...	...	...	...	...	0.688	...	82.3
2-Methylbutene-2	...	...	...	...	...	...	0.6834	...	101.0
Methyl n-Butyl Ketone	2-Heptanone	$\text{CH}_3\text{COCH}_2\text{CH}_2\text{CH}_2\text{CH}_3$	...	94	1.25	6.0	0.830	3.45	262
Methyl iso-Butyl Ketone	4-Methyl-2-Pentanone	$\text{CH}_3\text{COCH}_2\text{CH}(\text{CH}_3)_2$	...	...	...	...	0.803	3.45	244
Methyl Butyrate	...	$\text{CH}_3\text{COOCCH}_2\text{CH}_2\text{CH}_3$	...	57	...	...	0.895	3.45	315
Methyl Carbide	Diethylene Glycol Mono-methyl Ether	$\text{CH}_3\text{OCH}_2\text{CH}_2\text{OCH}_3$	...	300	...	...	1.034	4.14	375
Methyl Carbide Acetate	Diethylene Glycol Mono-methyl Ether Acetate	$\text{CH}_3\text{COOCH}_2\text{CH}_2\text{OCH}_3$	...	180	...	...	1.039	...	400
Methyl Cellulose	Ethylene Glycol Mono-methyl Ether	$\text{CH}_3\text{OCH}_2\text{CH}_2\text{OH}$	107	118	...	...	0.996	2.92	285
Methyl Cellulose Acetate	Ethylene Glycol Mono-methyl Ether Acetate	$\text{CH}_3\text{COOCH}_2\text{CH}_2\text{OCH}_3$	123	140	...	...	1.005	4.07	380
Methyl Chloride	Chloromethane	CH_3Cl	...	...	...	...	0.92	1.78	-11
Methyl Cyclohexane	Hexamethane	C_6H_{12}	...	...	1.18	...	0.770	8.36	214
Methyl Cyclohexane	Hexahydromethyl Phenol	$\text{C}_6\text{H}_{11}\text{OH}$	154	...	...	...	0.893	2.95	323
Methyl Cyclohexanone	Methyl Acet	$\text{CH}_3\text{C}_6\text{H}_{10}\text{CO}$	118	...	...	...	0.925	2.86	328
Methyl Cyclohexyl Acetate	...	$\text{CH}_3\text{COOCH}_2\text{C}_6\text{H}_{10}$	147	...	...	...	0.943	3.37	444
Methyldichloromethane	...	CH_2Cl_2	...	...	...	...	1.326	4.11	404
Methylene Chloride	Dichloromethane	CH_2Cl_2	...	...	12.5	96.9	1.326	2.93	104

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Part 2. PROPERTIES OF FLAMMABLE MATERIALS

Date 10-29-62

Cancels None

PROPERTIES OF FLAMMABLE LIQUIDS, GASES, AND SOLIDS—(Continued)

NAME	SYNONYMS	FORMULA	Flash Point °F.		Explosive Limits % by Vol. in Air		Specific Gravity (Air = 1.00)	Vapor Density (Air = 1.00)	Boiling Point °F.
			Closed Cup	Open Cup	Lower	Upper			
p-Phenylene Diamine Phenylhydrazine Phenyl Ethyl Alcohol Phenone	Diaminobenzene Phenyl Carbinal 2, 6, Dimethyl-2, 4 Naphthalen-4-One	$C_6H_4(NH_2)_2$ $C_6H_5NHNH_2$ $C_6H_5CH_2CH_2OH$ $(CH_3)_2C=CC(=O)CH_2C_6H_4$	812 216 216	303 185	...	...	1.007 1.024 0.879	3.72 4.91	812 245 288
Phenol-iso Phosphorus (Red) Phosphorus (Yellow) Phosphorus Sesquisulfide Phthalic Anhydride	2, 3, 5-Trimethyl- cyclohexene-2-one-1 Tetraphosphorus Trisulfide	$COCH_2CH_2C(CH_3)_2CH_3$ P_4 P_4S_3 $C_8H_4O_3$	...	205 ...	...	...	0.923 2.30 1.82 2.03 1.827	4.77	418 ...
Pinell, alpha Pinic Acid Pine Oil Pine Pitch Pinene, alpha	Alpha-methyl-pyridine Trinitrophenol	C_8H_9N $(NO_2)_3C_6H_2(OH)$ $C_{10}H_{16}$	Explosive 172 285 91	58 175	...	...	0.852 1.783 0.86 0.86	7.90	282 ...
Pine Resin Pine Tar Pine Tar Oil Polysulf Naphthalene Polysulfopentane	Colophony Wood Tar Oil	...	370 120 144	430 258	...	...	1.06 0.882 0.90-0.93 1.33	...	208 ...
Polyethylene Glycol 200 Mixture of Polymers Polyethylene Glycol 300 Mixture of Polymers Polyethylene Glycol 400 Mixture of Polymers	...	...	...	390 385 435	...	...	1.12 1.13 1.13	...	...
Polyethylene Glycol 600 Polyvinyl Alcohol Mixture of Polymers Potassium Potassium Kaolinite Potassiumamine-iso	Potassium Ethylazobutylate	K_2CO_3 K_2CO_3 $CH_3CH_2O(N=CH)CH_2NH_2$	...	475 175 205	...	...	1.18 0.882 1.555 0.9619	...	...
Propane Propionic Anhydride Propyl Acetate-iso Propyl Acetate-iso Propyl Alcohol-iso	Dimethylmethane Propionic Anhydride Propyl Acetate-iso Propyl Acetate-iso Propanol-1	C_3H_8 $(CH_3CH_2CO)_2O$ $CH_3COOCH_2CH_2CH_3$ $CH_3COOCH_2CH_2CH_3$ $CH_3CH_2CH_2OH$	800 185 46 43 59	2.9 7.7 1.77 1.78 2.15	7.3 8.0 2.0 2.0 18.5	...	1.50 1.012 0.886 0.877 0.804	1.50 4.49 3.82 3.82 2.07	42 328 218 186 207
Propyl Alcohol-iso Propyl Amine-iso Propyl Benzene-iso Propyl Benzene-iso Propyl Chloride-iso	Propanol-2 1-Phenylpropane 1-Chloropropane	$CH_3CH(OH)CH_3$ $(CH_3)_2CHNH_2$ $CH_3CH_2CH_2Cl$ $CH_3CH_2CH_2Cl$ $CH_3CH_2CH_2Cl$	53 46 102 102 40	50 -16	2.6 ...	...	0.789 0.884 0.882 0.884 0.890	2.07 2.00 4.14 4.14 2.71	191 122.2 216 211 114
Propyl Chloride-iso Propylene Propylene Chlorohydrin Propyleneimine	2-Chloropropane Propene 1-Chloro-2-Propanol 1, 2-Diaminopropane (anhydrous)	$CH_3CHClCH_3$ C_3H_6 $CH_3CH(OH)CH_2Cl$ $CH_3CH(NH_2)CH_2NH_2$	-26 80 125	...	2.9 2.0	10.7 11.1	0.889 1.118	2.71 3.26	93 261
Propylene Dichloride Propylene Glycol Propylene Oxide Propyl Ether-iso Propyl Formate-iso Propyl Formate-iso	1, 2-Dichloropropane 1, 2-Epoxypropane 2-Isopropoxypropane Propyl Methanolate Isopropyl Methanolate	$CH_2CHClCH_2Cl$ $CH_3CH(OH)CH_2OH$ $CH_3CH(OH)CH_2OH$ $(CH_3)_2CHOC(CH_3)_3$ $CH_3CH_2OCH_2CH_3$	310 -35 -18 27 22	225 -35 -16	2.63 2.1 ...	12.5 21.5	1.040 0.859 0.73 0.908 0.873	2.92 2.00 3.82 2.03 3.03	970 95 186 178 168
Pyridine Propyl Propionate-iso Pyromethane Quenching Oil Rape Seed Oil	1, 2-Benzene-diol Cotton Oil	C_5H_5N $CH_3CH_2COOCH_2CH_2CH_3$ C_4H_6 $C_{18}H_{34}$	68 261 325 325	175	1.8 ...	12.4	0.982 0.885 1.344 0.9	2.78 2.78 3.79	229 248 474
Rosin Rosin Oil Rubber Cement Rum Signal Oil	1, 2-Benzene-diol Rosin Oil Mineral Seal Oil	$C_9H_8O_2$ $C_{10}H_{16}$ $C_{10}H_{16}$	261 260 77 300	...	...	...	1.272 0.95-1.1	3.70	829 > 680
Sodium Soybean Oil Sperm Oil No. 1 Sperm Oil No. 2 Stearic Acid	Octadecanoic Acid	Na $CH_3(CH_2)_{16}COOH$	...	...	...	...	0.97 0.928	...	1611
Straw Oil Styrene Sulfur Sulfur Chloride Tallow	See Lubricating Oil Vinylbenzene	C_8H_8 C_8H_8 S_8 S_8	315-361 90 405 245 600	...	1.1 ...	6.1	0.907 0.906 1.937 0.985	8.60	285 323 440 280
Tallow Oil Tannic Acid Tartaric Acid Terphenyls Terphenyl-iso Terphenyl-iso	Tannin Resorcinol 1, 2-Diphenylbenzene 1, 2-Diphenylbenzene	$C_{12}H_{10}O_5$ $HOOC(CH_2OH)COOH.H_2O$ $C_{15}H_{10}$ $C_{15}H_{10}$	492 ...	200 410 325 375	...	...	0.914 1.567 1.14 1.164	...	...
Terphenyl-iso Tetrachloroethylene Tetraene Tetraene Tetraethyl Glycol	1, 4-Diphenylbenzene Pentachloroethylene Cetyl Cetyl HO(CH ₂) ₄ OH	$C_{18}H_{14}$ C_2Cl_4 $C_{18}H_{36}$ $C_{18}H_{36}$ $HO(CH_2)_4OH$	...	405 212 254 345	...	...	1.226 1.623 0.765 0.835 1.128	7.83 5.72 6.66 7.39 ...	788 248 498 627 621
Tetraethyl glycol Tetrahydrofuran Tetrahydrofuran Thioline	Tetraethyl glycol Tetrahydrofuran Tetrahydrofuran Thioline	$NR_2CH_2CH_2NR_2$ C_4H_8O C_4H_8O C_4H_8S	...	825 185-170 171	...	...	0.969 0.972	8.52 8.52	681 408
Thioline	Thioline	$SC(CH_3)_2SC(CH_3)_2SC(CH_3)_2$	...	200	...	...	1.06	8.68	d.

5-4273-M

The Firestone Tire & Rubber Company



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PRIOR RELEASE NO. 37

PROPERTIES OF FLAMMABLE LIQUIDS, GASES, AND SOLIDS

Flash Point of the liquid is the temperature at which it gives off vapor sufficient to form an ignitable mixture with the air near the surface of the liquid or within the vessel used. By "ignitable mixture" is meant a mixture within the explosive range that is capable when ignited of the propagation of flame away from the source of ignition. By "propagation of flame" is here meant the spread of flame from layer to layer independently of the source of ignition. A gas or vapor mixed with air in proportions below the lower limit of flammability may burn at the source of ignition; that is, in the zone immediately surrounding the source of ignition, without propagating (spreading) away from the source of ignition. Some evaporation takes place below the above temperature, when vapor does not go off freely enough to meet flash point classification requirements. There are certain solids, such as camphor and naphthalene, that slowly evaporate or volatilize at ordinary room temperature and, therefore, have flash points which still in the solid state.

Ignition Temperature of a substance, whether solid, liquid, or gaseous, is the minimum temperature required to initiate or cause self-sustained combustion independently of the heating or heated element. Ignition temperature of a solid is influenced by its physical condition, environment and the rate of heating.

By "ignition temperature" of a vapor or gas is here meant the lowest temperature (minimum ignition temperature) to which any part of a flammable gas or vapor-air mixture must be raised by application of heat to cause combustion that will propagate itself. The lowest of minimum temperature to cause ignition is also known as the "auto" or "autogenous" ignition temperature. In most cases of ignition under practical conditions external heat is applied locally. It is to be noted in this connection that if the external source of heat is a spark, its heat capacity (its mass multiplied by its specific heat) must be sufficient to raise an appreciable amount of the substance to the ignition temperature to cause ignition, and hence, momentary contact of a minute spark if inert (non-combustible), even though at a high temperature, may fail to cause ignition.

By "ignition temperature" of a solid is here meant the lowest temperature (the minimum temperature) to which any part of it must be raised by application of heat to cause self-sustained combustion.



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1. Flash Point.

A. For hydrocarbon mixtures, such as gasolines, "safety" solvents, naphthas, etc.

Flash Point ($^{\circ}\text{F.}$) = $0.73 \times \text{initial boiling point } (^{\circ}\text{F.}) - 122$

Examples

Sovasol #4 has an initial boiling point of 242°F.

F. P. = $(0.73 \times 242) - 122 = 54^{\circ}\text{F.}$

Actual test shows 48°F.

Sovasol #6 has an initial boiling point of 368°F.

F. P. = $(0.73 \times 368) - 122 = 146^{\circ}\text{F.}$

Actual test shows 142°F.

B. For a chemical compound of known composition.

Flash Point = temperature at which the vapor pressure is equal to atmospheric pressure divided by 8 times the mols of oxygen needed for complete combustion.

Example

Ethyl acetate is $\text{CH}_3\text{COOCH}_2\text{CH}_3$

$\text{CH}_3\text{COOCH}_2\text{CH}_3 + 5\text{O}_2 = 4\text{CO}_2 + 4\text{H}_2\text{O}$

$760 = 19$

8×5

From the vapor pressure curve on page 94, the flash point temperature then is about 23°F.

2. Lower Explosive Limit.

For a chemical compound of known composition.

Lower explosive limit = 10.8 divided by the mols of oxygen needed for complete combustion.

Example

Again taking ethyl acetate.

$10.8 = 2.16$

5

The observed figure is 2.18.

3. Vapor Density and Molecular Weight

For a chemical compound of known composition, vapor density (air = 1) = Molecular weight $\times 0.0345$. Conversely, Molecular weight = vapor density divided by 0.0345.

[]

Standard Forms

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Part 1. SAFETY INSPECTION PROGRAM FORMS

AC MOTOR AND CONTROL (FORM S-4356-1)

[illegible]

S-4279-M

The Firestone Tire & Rubber Company

SUBJECT TO DISCLOSURE RESTRICTION

40831



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Date 3-8-63
Cancels NONE

BOM & NAF CURING PRESSES (FORM S-4356-2)

SAFETY INSPECTION WORK ORDER											
BOM & NAF CURING PRESSES - SAFETY INSPECTION											
ITEM											
1. PLANT											
2. PRESSURE											
3. SAFETY											
4. INSPECTION											
1	2	3	4	5	6	7	8	9	10	11	12
JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
YELLOW	GREEN	BLUE	RED	WHITE	PINK	YELLOW	GREEN	BLUE	RED	WHITE	PINK
1. PLANT						2. PRESSURE					
3. SAFETY						4. INSPECTION					
5. REPAIRS						6. COMMENTS					
7. DATE						8. TIME					
9. SIGNATURE						10. INITIALS					
11. FREQUENCY CODE						12. FREQUENCY CODE					
13. FREQUENCY CODE						14. FREQUENCY CODE					
15. FREQUENCY CODE						16. FREQUENCY CODE					
17. FREQUENCY CODE						18. FREQUENCY CODE					
19. FREQUENCY CODE						20. FREQUENCY CODE					
21. FREQUENCY CODE						22. FREQUENCY CODE					
23. FREQUENCY CODE						24. FREQUENCY CODE					
25. FREQUENCY CODE						26. FREQUENCY CODE					
27. FREQUENCY CODE						28. FREQUENCY CODE					
29. FREQUENCY CODE						30. FREQUENCY CODE					
31. FREQUENCY CODE						32. FREQUENCY CODE					
33. FREQUENCY CODE						34. FREQUENCY CODE					
35. FREQUENCY CODE						36. FREQUENCY CODE					
37. FREQUENCY CODE						38. FREQUENCY CODE					
39. FREQUENCY CODE						40. FREQUENCY CODE					
41. FREQUENCY CODE						42. FREQUENCY CODE					
43. FREQUENCY CODE						44. FREQUENCY CODE					
45. FREQUENCY CODE						46. FREQUENCY CODE					
47. FREQUENCY CODE						48. FREQUENCY CODE					
49. FREQUENCY CODE						50. FREQUENCY CODE					
51. FREQUENCY CODE						52. FREQUENCY CODE					
53. FREQUENCY CODE						54. FREQUENCY CODE					
55. FREQUENCY CODE						56. FREQUENCY CODE					
57. FREQUENCY CODE						58. FREQUENCY CODE					
59. FREQUENCY CODE						60. FREQUENCY CODE					
61. FREQUENCY CODE						62. FREQUENCY CODE					
63. FREQUENCY CODE						64. FREQUENCY CODE					
65. FREQUENCY CODE						66. FREQUENCY CODE					
67. FREQUENCY CODE						68. FREQUENCY CODE					
69. FREQUENCY CODE						70. FREQUENCY CODE					
71. FREQUENCY CODE						72. FREQUENCY CODE					
73. FREQUENCY CODE						74. FREQUENCY CODE					
75. FREQUENCY CODE						76. FREQUENCY CODE					
77. FREQUENCY CODE						78. FREQUENCY CODE					
79. FREQUENCY CODE						80. FREQUENCY CODE					
81. FREQUENCY CODE						82. FREQUENCY CODE					
83. FREQUENCY CODE						84. FREQUENCY CODE					
85. FREQUENCY CODE						86. FREQUENCY CODE					
87. FREQUENCY CODE						88. FREQUENCY CODE					
89. FREQUENCY CODE						90. FREQUENCY CODE					
91. FREQUENCY CODE						92. FREQUENCY CODE					
93. FREQUENCY CODE						94. FREQUENCY CODE					
95. FREQUENCY CODE						96. FREQUENCY CODE					
97. FREQUENCY CODE						98. FREQUENCY CODE					
99. FREQUENCY CODE						100. FREQUENCY CODE					

INSTRUCTIONS AND PROCEDURES

SAFETY BAR: Start press closing with press control air cut off. When mold is half closed, hit safety bar. Press should reverse and open up fully.

RELEASE: Start press closed, with air off as above. When press is half closed and lid horizontal, press the stop button. Press should stop within one (1) inch.

STRAIN SAFETIES: (Shear Strip only) Closed press half to three quarters, air off. Trip strain safeties by hand, and then attempt to open press. It should not open, if it does give strain safeties a complete check out.

PRESSURE SWITCH: Put press in half closed position, with shaping off. Let in enough preinflation (6 to 8 psi) to expand bladder, then try to open press. It should not open.

REPAIR: Repair immediately any faulty equipment and record on back side of this report.

13-1000-1-1-101

FINESTONE SAFETY INSPECTION SYSTEM

Form No. 1-101

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CONVEYOR BELTS INSPECTION (Form S-4356-4)

SAFETY INSPECTION WORK ORDER											
CONVEYOR BELTS INSPECTION											
ITEM											
1. PLANT											
2. LOCATION											
3. DATE TESTED											
4. TESTED BY											
5. DATE ISSUED											
6. SERIAL NO.											
INSTRUCTIONS AND PROCEDURES (INSPECT MONTHLY)											
TYPES: Belts, Roller, Screw											
BELT: Date Tested:											
Safety rope to be installed on all belt conveyors regardless of size. Belts should be taunt and free from ragged edges and cut out sections. Under belt guide, rollers shall be guarded to eliminate pinch points or caught-between hazards.											
ROLLER: Date Tested:											
Safety rope to be installed on all roller-type conveyors. Rope to be taunt and in good working condition. Conveyor shall not be operated with missing rollers.											
SCREW: Date Tested:											
Complete cover over, all sizes. Where inspection of material flow is required, expanded metal one-half to one inch opening is satisfactory and this should be bolted down.											
Where inspection of material by feeling is required or sampling is desired, cover of sheet or expanded metal should be of hinge type with limit switch control to stop the unit cover is raised.											
Safety rope shall be installed above conveyor regardless of covering or size of conveyor.											
GOOD FAIR POOR MADE REPAIR											
() () () ()											
Safety Rope Condition											
() () () ()											
Condition of Belt, Roller, Screw Conveyor											
() () () ()											
Limit Switch Condition											
() () () ()											
Limit Switch Operation											
() () () ()											
REMARKS:											
DISTRIBUTION:											
Plant Engineer											
Master Mechanic											
Safety Engineer											
Department Mgr.											
INSPECTED BY:											
DATE:											
FORM S-4356-4											



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Date 3-8-63
Cancels NONE

COLSON JACKS, SAFETY INSPECTION (FORM S-4356-5)

SAFETY INSPECTION WORK ORDER											
COLSON JACKS, SAFETY INSPECTION											
PROPERTY NO. _____ DATE _____											
LOCATION _____											
SAFETY INSPECTION											
DEFECTS											
REMARKS											
1	2	3	4	5	6	7	8	9	10	11	12
JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
YELLOW	GREEN	BLUE	WHITE	PINK	RED	ORANGE	BROWN	BLACK	GRAY	PURPLE	PINK
FREQUENCY CODE											
1. ANNUAL											
2. SEMI-ANNUAL											
3. QUARTERLY											
4. MONTHLY											
5. WEEKLY											
6. DAILY											
7. OTHER											
8. FREQUENCY											
9. FREQUENCY											
10. FREQUENCY											
11. FREQUENCY											
12. FREQUENCY											
13. FREQUENCY											
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16. FREQUENCY											
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19. FREQUENCY											
20. FREQUENCY											
21. FREQUENCY											
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25. FREQUENCY											
26. FREQUENCY											
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41. FREQUENCY											
42. FREQUENCY											
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45. FREQUENCY											
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97. FREQUENCY											
98. FREQUENCY											
99. FREQUENCY											
100. FREQUENCY											

INSTRUCTIONS AND PROCEDURES (INSERT DAILY & QUARTERLY)

All Colson Jacks are to be inspected daily by the Producing Departments. It is preferred that the Operator using the Jack make the inspection.

Quarterly the Maintenance department will make an inspection of all Colson Jacks. At this time the Safety Engineer will be advised of the quarterly inspection at which time he will follow up the producing department to determine that daily inspections are being made.

The following items should be inspected by both the Production and Maintenance Departments.

1. The wheels of the Jack should be inspected for wear.
2. The pins and catch of the lifting mechanism should be inspected to determine if it is operating properly. These parts should also be inspected for wear.
3. The steel handles made of tubing should be inspected to determine if they are cracked, particularly at the fulcrum point.

Parts requiring replacement or repair should be handled by maintenance at the time of the inspection. Note on this report any maintenance work completed as a result of the Safety Inspection.

REMARKS:

Prod. Manager
Plant Engineer
Master Mechanic
Safety Engineer

INSPECTED BY: _____
DATE: _____

FORM S-4356-5



CALENDERS & MILLS, SAFETY SHOP TEST (FORM S-4356-6)

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Date 3-8-63

Cancels NONE

DIRECT CURRENT MOTOR (OR GENERATOR) & CONTROL INSPECTION (FORM S-4356-7)

SAFETY INSPECTION WORK ORDER											
DIRECT CURRENT MOTOR (OR GENERATOR) & CONTROL INSPECTION											
PROPERTY NO. _____ SERIAL NO. _____											
MOTOR MFR. _____											
CONTROL											
ITEMS											
REMARKS											
MOTOR (ON GENERATOR)											
REMARKS											
22. Type											
23. Field Winding											
24. Arm Winding											
25. Arm Bands											
26. Commutator											
27. Brushes											
28. Brush Holders											
29. Connections											
30. Air Gap											
31. Bearing Clearance											
32. End Play											
33. Oil Level											
34. Oil Rings											
35. Oil Leaks											
36. Fan Blades											
37. Best Bolts											
38. Winding Varnish											
39. Field Wdg. Res. To Grd.											
40. Arm Wdg. Res. To Grd.											
41. General Condition											
42. Surrounding Condition											

INSTRUCTIONS AND PROCEDURES: (INSPECT ANNUALLY)
Refer to the manufacturers instruction manual for detailed inspection instructions. Record below the maintenance work performed.

MAINTENANCE WORK PERFORMED:

REMARKS:

INSPECTED BY: _____ DATE: _____

AKRON Elec. Eng. Div.
Plant Engineer
Plant Elec. Eng.
Master Mechanic
Electrical Foreman
Safety Engineer

FORM S-4356-7



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Part 1. SAFETY INSPECTION PROGRAM FORMS

Date 3-8-63
Cancels NONE

DOOR INSPECTION (POWERED OVERHEAD) (FORM S-4356-8)

SAFETY INSPECTION WORK ORDER											
DOOR INSPECTION (POWERED OVERHEAD)											
LOCATION											
PROPERTY NO.											
DATE INSPECTED											
WEEK											
MONTH											
YEAR											
FREQUENCY CODE											
DISTRIBUTION											
INSPECTED BY											
DATE											
LITHO - U.S.A.											
INSTRUCTIONS AND PROCEDURES (INSPECT QUARTERLY)											
Inspect all power actuated overhead doors in the plant. Mark any necessary repairs to the door at the time of the inspection and report below any maintenance work done as a result of this inspection.											
Inspect carefully the following:											
1. The condition and operation of the cables.											
2. The safety mechanism, "check the free fall drop".											
3. The drive, screw, pins and latch noting wear of these parts.											
4. Disconnect the drive and check the spring tension versus door balance when closing.											
REMARKS:											

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Part 1. SAFETY INSPECTION PROGRAM FORMS

Date 3-8-63
Cancel NONE

ELEVATOR INSPECTION REPORT (FORM 5-4356-9)

[illegible]

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Part 1. SAFETY INSPECTION PROGRAM FORMS

Date 3-8-63
Cancels NONE

ELECTRIC CABLE AND MANHOLE INSPECTION REPORT (FORM 4356-10)

SAFETY INSPECTION WORK ORDER											
ELECTRIC CABLE AND MANHOLE INSPECTION REPORT											
DATE: _____ TIME: _____											
LOCATION: _____											
INSPECTOR: _____											
DATE INSPECTED: _____											
CABLE TYPES											
As Left											
1. Manhole Water Over Cables Water on Floor But Cables											
2. Floor Under Clean Stopped None											
3. Manhole Drain Clear Grubbing											
4. Manhole Cover Solid Needs Reinforcing											
5. Manhole Ground Rod In Place No Rod Connection Good											
6. Vent Ducts North South East West											
7. Cables Rubber Through Manhole											
8. Cables Rubber Properly Fireproofed Not Fireproofed											
9. Head Fireproofings Repair											
10. Cable Seals Rubber OK Head Repair											
11. Cables Rubber Banded To Ground Not Grounded with Ground Bonds											
12. Cables Rubber Properly Taped Head Taps											
13. Cable Heads Rubber OK Head Minor Repair											
14. Head Replacement Additional Racks Needed											
15. Air Temperature Outside Manhole Inside Manhole											
16. Cables After Lifting Cover											
17. Cables Rubber Code Not To Not For											
18. Steady Touch With Bare Hand Item Too Hot Cables:											
INSTRUCTIONS AND PROCEDURES (INSPECT ANNUALLY)											
Refer To Electrical Standards Manual Section 0.2 page 5 for detailed instructions. List below any additional information on conditions not covered above. Minor improvements and repairs should be made at the time of inspection.											
MAINTENANCE WORK PERFORMED											
COMMENTS											



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Part 1. SAFETY INSPECTION PROGRAM FORMS

Date 3-8-63
Cancels NONE

FIRE PROTECTIVE EQUIPMENT INSPECTION (FORM S-4356-11)

1 2 3 4 5 6 7 8 9 10 11 12

MONTH

YEAR

SAFETY INSPECTION WORK ORDER

FIRE PROTECTIVE EQUIPMENT INSPECTION

ITEM

DATE

TIME

LOCATION

INSPECTOR

DATE ISSUED

PROPERTY NO.

REMARKS

SPRINKLER VALVES

Check Condition of Valve As Found

1. AREA CONTROLLED

2. List Both Inside

3. And Outside Valves

4. 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30.

Sealed

Shut

Open

Remarks

IF Sprinklers were closed since last weekly inspection were read

Tags Used... () . Note Valves reopened wide and sealed.....

Has a Good Full-Flow Drain Test made after each valve was reopened?.....

INSTRUCTIONS AND PROCEDURE (INSPECT MONTHLY)

File out this report while making inspection. Do Not report a Valve open

unless you personally have inspected and tested it. Every valve con-

trolling sprinklers or water supplies to sprinklers should be listed.

Use term "Does Not Apply" where Applicable.

DRY PIPE VALVES:

No. 1 Valve Room Properly Heated?..... Air Pressure..... Alarms OK?.....

No. 2 Valve Room Properly Heated?..... Air Pressure..... Alarms OK?.....

Remarks:

Water Pressure..... lb. At Yard Level

PIPE PUMP: Turned Over And Found In Good Condition?.....

Suction Reservoir Full?..... Priming Tank Full?.....

SPRINKLER TANK: Full?..... Heating System In Use?.....

Temperature At Cold Water Return..... Circ. Good?.....

HYDRAULIC & ROSE EQUIPMENT: In Good Condition?.....

Remarks:

AUTOMATIC SPRINKLERS: Any Heads Missing?.....

Disconnected?..... Obstructed By High Piled Stock?.....

Any Room Not Sufficiently Heated To Prevent Freezing?.....

How Many Extra Heads Available?.....

SPRINKLER ALARMS: Tested?..... In Good Condition?.....

Do Not Test Hydraulic Alarms when temperatures are below freezing.

Fire Pails, Extinguishers, Small Hose: In Good Condition?.....

Fire Doors and Shutters: All Inspected?..... In Good Order?.....

Electrical Equipment: Any Defects Noted?.....

Remarks:

HOUSEKEEPING: Good Throughout?.....

REMARKS: (On Matters relating to Fire Hazards. Use other side to explain details and steps being taken for corrections.)

INSPECTED BY:

DATE:

APPROVED BY:

DATE:

SAFETY ENGINEER

PLANT FIRE CHIEF

AKRON INS. DEPT.

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Part 1. SAFETY INSPECTION PROGRAM FORMS

Date 3-8-63
Cancels NONE

FLAP MOLD PRESS INSPECTION (FORM S-4356-12)

| SAFETY INSPECTION WORK ORDER | | | | | | | | | | | |
|------------------------------|--|----------|--|----------|--|----------|--|----------|--|----------|--|
| FIAP MOLD PRESS INSPECTION | | | | | | | | | | | |
| ITEM | | WEIGHT | | LOCATION | | DATE | | TIME | | PAGE | |
| 1. PLANT | | 1. 1000 | | 1. 1000 | | 1. 1000 | | 1. 1000 | | 1. 1000 | |
| 2. 1000 | | 2. 1000 | | 2. 1000 | | 2. 1000 | | 2. 1000 | | 2. 1000 | |
| 3. 1000 | | 3. 1000 | | 3. 1000 | | 3. 1000 | | 3. 1000 | | 3. 1000 | |
| 4. 1000 | | 4. 1000 | | 4. 1000 | | 4. 1000 | | 4. 1000 | | 4. 1000 | |
| 1. 1000 | | 1. 1000 | | 1. 1000 | | 1. 1000 | | 1. 1000 | | 1. 1000 | |
| 2. 1000 | | 2. 1000 | | 2. 1000 | | 2. 1000 | | 2. 1000 | | 2. 1000 | |
| 3. 1000 | | 3. 1000 | | 3. 1000 | | 3. 1000 | | 3. 1000 | | 3. 1000 | |
| 4. 1000 | | 4. 1000 | | 4. 1000 | | 4. 1000 | | 4. 1000 | | 4. 1000 | |
| 5. 1000 | | 5. 1000 | | 5. 1000 | | 5. 1000 | | 5. 1000 | | 5. 1000 | |
| 6. 1000 | | 6. 1000 | | 6. 1000 | | 6. 1000 | | 6. 1000 | | 6. 1000 | |
| 7. 1000 | | 7. 1000 | | 7. 1000 | | 7. 1000 | | 7. 1000 | | 7. 1000 | |
| 8. 1000 | | 8. 1000 | | 8. 1000 | | 8. 1000 | | 8. 1000 | | 8. 1000 | |
| 9. 1000 | | 9. 1000 | | 9. 1000 | | 9. 1000 | | 9. 1000 | | 9. 1000 | |
| 10. 1000 | | 10. 1000 | | 10. 1000 | | 10. 1000 | | 10. 1000 | | 10. 1000 | |
| 11. 1000 | | 11. 1000 | | 11. 1000 | | 11. 1000 | | 11. 1000 | | 11. 1000 | |
| 12. 1000 | | 12. 1000 | | 12. 1000 | | 12. 1000 | | 12. 1000 | | 12. 1000 | |

| INSTRUCTIONS AND PROCEDURES (INSPECT QUARTERLY) | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|
| Inspect Universal and McNeil Flap Mold Presses as follows: | | | | | | | | | | | |
| Universal | | | | | | | | | | | |
| 1. Hinge | | | | | | | | | | | |
| 2. Latch | | | | | | | | | | | |
| 3. Pin Wear | | | | | | | | | | | |
| 4. Straps, knuckles, Fulcrum points | | | | | | | | | | | |
| 5. Pressure gage & correct adjustment | | | | | | | | | | | |
| Report below all minor repair made as a result of this inspection. | | | | | | | | | | | |
| REMARKS: | | | | | | | | | | | |
| | | | | | | | | | | | |

| FREQUENCY CODE | | | | | | | | | | | |
|----------------|--|--|--|--|--|--|--|--|--|--|--|
| 1. ANNUAL | | | | | | | | | | | |
| 2. SEMI-ANNUAL | | | | | | | | | | | |
| 3. QUARTERLY | | | | | | | | | | | |
| 4. BI-MONTHLY | | | | | | | | | | | |
| 5. MONTHLY | | | | | | | | | | | |
| 6. WEEKLY | | | | | | | | | | | |
| 7. DAILY | | | | | | | | | | | |
| 8. CONTINUOUS | | | | | | | | | | | |
| 9. AS REQUIRED | | | | | | | | | | | |
| 10. ON DEMAND | | | | | | | | | | | |
| 11. AS NEEDED | | | | | | | | | | | |
| 12. AS ADVISED | | | | | | | | | | | |
| | | | | | | | | | | | |

| DISTRIBUTION | | | | | | | | | | | |
|--------------------|--|--|--|--|--|--|--|--|--|--|--|
| 1. PLANT ENGINEER | | | | | | | | | | | |
| 2. MASTER MECHANIC | | | | | | | | | | | |
| 3. INSPECTED BY | | | | | | | | | | | |
| DATE | | | | | | | | | | | |
| TIME - P.M. | | | | | | | | | | | |
| | | | | | | | | | | | |

S-4273-M

The Firestone Tire & Rubber Company

SUBJECT TO DISCLOSURE RESTRICTION

40842



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Date 3-8-63
Cancels NONE

| MONTHS | | | | | | | | | | | | SAFETY INSPECTION WORK ORDER | | | | | | | | | | | |
|----------------|--|--|--|--|--|--|--|--|--|--|--|---------------------------------|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | GRINDING, EQUIPMENT - ALL KINDS | | | | | | | | | | | |
| ITEM | | | | | | | | | | | | LOCATION | | | | | | | | | | | |
| WEED | | | | | | | | | | | | SAFETY | | | | | | | | | | | |
| 1 | | | | | | | | | | | | 1 | | | | | | | | | | | |
| 2 | | | | | | | | | | | | 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | | 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | | 4 | | | | | | | | | | | |
| PROPERTY NO. | | | | | | | | | | | | EQUIP. NO. | | | | | | | | | | | |
| DATE ISSUED | | | | | | | | | | | | DATE RECEIVED | | | | | | | | | | | |
| DEPT. | | | | | | | | | | | | LOCATION | | | | | | | | | | | |
| SIZE-OF | | | | | | | | | | | | CORRECT WHEELS | | | | | | | | | | | |
| GUARDS | | | | | | | | | | | | SAFETY | | | | | | | | | | | |
| TOOL REST | | | | | | | | | | | | SHIELD | | | | | | | | | | | |
| FREQUENCY CODE | | | | | | | | | | | | | | | | | | | | | | | |
| 1. ANNUAL | | | | | | | | | | | | | | | | | | | | | | | |
| 2. SEMI-ANNUAL | | | | | | | | | | | | | | | | | | | | | | | |
| 3. QUARTERLY | | | | | | | | | | | | | | | | | | | | | | | |
| 4. MONTHLY | | | | | | | | | | | | | | | | | | | | | | | |
| 5. WEEKLY | | | | | | | | | | | | | | | | | | | | | | | |
| 6. DAILY | | | | | | | | | | | | | | | | | | | | | | | |
| 7. OTHER | | | | | | | | | | | | | | | | | | | | | | | |
| PROPERTY NO. | | | | | | | | | | | | EQUIP. NO. | | | | | | | | | | | |
| DATE ISSUED | | | | | | | | | | | | DATE RECEIVED | | | | | | | | | | | |
| DEPT. | | | | | | | | | | | | LOCATION | | | | | | | | | | | |
| SIZE-OF | | | | | | | | | | | | CORRECT WHEELS | | | | | | | | | | | |
| GUARDS | | | | | | | | | | | | SAFETY | | | | | | | | | | | |
| TOOL REST | | | | | | | | | | | | SHIELD | | | | | | | | | | | |
| FREQUENCY CODE | | | | | | | | | | | | | | | | | | | | | | | |
| 1. ANNUAL | | | | | | | | | | | | | | | | | | | | | | | |
| 2. SEMI-ANNUAL | | | | | | | | | | | | | | | | | | | | | | | |
| 3. QUARTERLY | | | | | | | | | | | | | | | | | | | | | | | |
| 4. MONTHLY | | | | | | | | | | | | | | | | | | | | | | | |
| 5. WEEKLY | | | | | | | | | | | | | | | | | | | | | | | |
| 6. DAILY | | | | | | | | | | | | | | | | | | | | | | | |
| 7. OTHER | | | | | | | | | | | | | | | | | | | | | | | |
| PROPERTY NO. | | | | | | | | | | | | EQUIP. NO. | | | | | | | | | | | |
| DATE ISSUED | | | | | | | | | | | | DATE RECEIVED | | | | | | | | | | | |
| DEPT. | | | | | | | | | | | | LOCATION | | | | | | | | | | | |
| SIZE-OF | | | | | | | | | | | | CORRECT WHEELS | | | | | | | | | | | |
| GUARDS | | | | | | | | | | | | SAFETY | | | | | | | | | | | |
| TOOL REST | | | | | | | | | | | | SHIELD | | | | | | | | | | | |
| FREQUENCY CODE | | | | | | | | | | | | | | | | | | | | | | | |
| 1. ANNUAL | | | | | | | | | | | | | | | | | | | | | | | |
| 2. SEMI-ANNUAL | | | | | | | | | | | | | | | | | | | | | | | |
| 3. QUARTERLY | | | | | | | | | | | | | | | | | | | | | | | |
| 4. MONTHLY | | | | | | | | | | | | | | | | | | | | | | | |
| 5. WEEKLY | | | | | | | | | | | | | | | | | | | | | | | |
| 6. DAILY | | | | | | | | | | | | | | | | | | | | | | | |
| 7. OTHER | | | | | | | | | | | | | | | | | | | | | | | |
| PROPERTY NO. | | | | | | | | | | | | EQUIP. NO. | | | | | | | | | | | |
| DATE ISSUED | | | | | | | | | | | | DATE RECEIVED | | | | | | | | | | | |
| DEPT. | | | | | | | | | | | | LOCATION | | | | | | | | | | | |
| SIZE-OF | | | | | | | | | | | | CORRECT WHEELS | | | | | | | | | | | |
| GUARDS | | | | | | | | | | | | SAFETY | | | | | | | | | | | |
| TOOL REST | | | | | | | | | | | | SHIELD | | | | | | | | | | | |
| FREQUENCY CODE | | | | | | | | | | | | | | | | | | | | | | | |
| 1. ANNUAL | | | | | | | | | | | | | | | | | | | | | | | |
| 2. SEMI-ANNUAL | | | | | | | | | | | | | | | | | | | | | | | |
| 3. QUARTERLY | | | | | | | | | | | | | | | | | | | | | | | |
| 4. MONTHLY | | | | | | | | | | | | | | | | | | | | | | | |
| 5. WEEKLY | | | | | | | | | | | | | | | | | | | | | | | |
| 6. DAILY | | | | | | | | | | | | | | | | | | | | | | | |
| 7. OTHER | | | | | | | | | | | | | | | | | | | | | | | |
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| SIZE-OF | | | | | | | | | | | | CORRECT WHEELS | | | | | | | | | | | |
| GUARDS | | | | | | | | | | | | SAFETY | | | | | | | | | | | |
| TOOL REST | | | | | | | | | | | | SHIELD | | | | | | | | | | | |
| FREQUENCY CODE | | | | | | | | | | | | | | | | | | | | | | | |
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| 2. SEMI-ANNUAL | | | | | | | | | | | | | | | | | | | | | | | |
| 3. QUARTERLY | | | | | | | | | | | | | | | | | | | | | | | |
| 4. MONTHLY | | | | | | | | | | | | | | | | | | | | | | | |
| 5. WEEKLY | | | | | | | | | | | | | | | | | | | | | | | |
| 6. DAILY | | | | | | | | | | | | | | | | | | | | | | | |
| 7. OTHER | | | | | | | | | | | | | | | | | | | | | | | |
| PROPERTY NO. | | | | | | | | | | | | EQUIP. NO. | | | | | | | | | | | |
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| TOOL REST | | | | | | | | | | | | SHIELD | | | | | | | | | | | |
| FREQUENCY CODE | | | | | | | | | | | | | | | | | | | | | | | |
| 1. ANNUAL | | | | | | | | | | | | | | | | | | | | | | | |
| 2. SEMI-ANNUAL | | | | | | | | | | | | | | | | | | | | | | | |



ADMINISTRATION MANUAL

HEALTH, SAFETY ENGINEERING & PROPERTY PROTECTION

Section XIII SAFETY, MEDICAL AND PROPERTY PROTECTION FORMS

VOLUME I

Page 13.1.14

Part 1. SAFETY INSPECTION PROGRAM FORMS

Date 3-8-63

Cancels NONE

HOISTING EQUIPMENT (ALL KINDS) (FORM S-4356-14)

| SAFETY INSPECTION WORK ORDER | | | | | | | | | | | |
|--------------------------------|-------|-----|-------|------|------|-------|------|-------|--------|------|-------|
| HOISTING EQUIPMENT (ALL KINDS) | | | | | | | | | | | |
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| LOCATION _____ | | | | | | | | | | | |
| DATE INSPECTED _____ | | | | | | | | | | | |
| INSPECTED BY _____ | | | | | | | | | | | |
| REMARKS _____ | | | | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| YELLOW | GREEN | RED | WHITE | PINK | BLUE | BLACK | GRAY | BROWN | PURPLE | PINK | WHITE |
| FREQUENCY CODE | | | | | | | | | | | |
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INSTRUCTIONS AND PROCEDURES (INSPECT MONTHLY)
Report immediately to the Foreman or Master Mechanic any hoisting equipment needing immediate repair. Report any hoist which in your opinion is not used properly or is too light for the job.

REMARKS:

DATE: _____

INSPECTED BY: _____

Plant Engineer _____
Master Mechanic _____
Safety Engineer _____
Production Manager _____

FORM NO. S-4356-14

PINESTONE SAFETY INSPECTION SYSTEM

ADMINISTRATION MANUAL

HEALTH, SAFETY ENGINEERING & PROPERTY PROTECTION

Section XIII SAFETY, MEDICAL AND PROPERTY PROTECTION FORMS

VOLUME I
Page 13.1.15

Part 1. SAFETY INSPECTION PROGRAM FORMS

Date 3-8-63
Cancel NONE

HAND POWERED TOOLS - ELEC. GROUND (FORM S-4356-15)

| SAFETY INSPECTION WORK ORDER | | | | | | | | | | | |
|--|-------|------------|-----|-------|------|------|--------|----------|-------|---------|--------|
| HAND POWERED TOOLS - ELEC. GROUND | | | | | | | | | | | |
| ITEM | | WHERE | | WHEN | | BY | | FOR | | DATE | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC |
| YELLOW | GREEN | BLACK | RED | WHITE | PINK | TEAL | ORANGE | BLUE | BROWN | GRAY | PURPLE |
| 1 | | 2 | | 3 | | 4 | | 5 | | 6 | |
| PROPERTY NO. | | SERIAL NO. | | DATE | | TIME | | LOCATION | | REMARKS | |
| <p>INSTRUCTIONS AND PROCEDURES (INSERT SEMI ANNUALLY)</p> <p>Inspect all electric powered hand tools to determine that these tools are equipped with an adequate ground. Two methods of grounding are approved:</p> <p>1. A three cable, three prong system in which one cable is the ground wire.
(This method is preferred.)</p> <p>2. A separate ground wire with clamp which may be connected to a suitable ground.</p> <p>Report below all electric powered hand tools found during the inspection not equipped with one of the above type grounding methods.</p> <p>At the time of the inspection make any necessary repairs to the ground and cord.</p> <p>REMARKS:</p> | | | | | | | | | | | |
| <p>INSPECTED BY: _____</p> <p>DATE: _____</p> <p>SAFETY ENGINEER: _____</p> <p>SAFETY INSPECTOR: _____</p> <p>SAFETY OFFICER: _____</p> <p>SAFETY MANAGER: _____</p> <p>SAFETY DIRECTOR: _____</p> <p>SAFETY CHIEF: _____</p> <p>SAFETY SUPERVISOR: _____</p> <p>SAFETY ASSISTANT: _____</p> <p>SAFETY CLERK: _____</p> <p>SAFETY RECORDS: _____</p> <p>SAFETY TRAINING: _____</p> <p>SAFETY EQUIPMENT: _____</p> <p>SAFETY MATERIALS: _____</p> <p>SAFETY TOOLS: _____</p> <p>SAFETY SUPPLIES: _____</p> <p>SAFETY SERVICES: _____</p> <p>SAFETY CONTRACTORS: _____</p> <p>SAFETY SUBCONTRACTORS: _____</p> <p>SAFETY VENDORS: _____</p> <p>SAFETY DISTRIBUTORS: _____</p> <p>SAFETY AGENTS: _____</p> <p>SAFETY REPRESENTATIVES: _____</p> <p>SAFETY ADVISORS: _____</p> <p>SAFETY CONSULTANTS: _____</p> <p>SAFETY SPECIALISTS: _____</p> <p>SAFETY EXPERTS: _____</p> <p>SAFETY PROFESSIONALS: _____</p> <p>SAFETY ACADEMICS: _____</p> <p>SAFETY RESEARCHERS: _____</p> <p>SAFETY INNOVATORS: _____</p> <p>SAFETY LEADERS: _____</p> <p>SAFETY FOLLOWERS: _____</p> <p>SAFETY TEAMWORKERS: _____</p> <p>SAFETY COOPERATORS: _____</p> <p>SAFETY SUPPORTERS: _____</p> <p>SAFETY ASSISTERS: _____</p> <p>SAFETY HELPERS: _____</p> <p>SAFETY SERVERS: _____</p> <p>SAFETY PROVIDERS: _____</p> <p>SAFETY GIVERS: _____</p> <p>SAFETY SHARERS: _____</p> <p>SAFETY BORROWERS: _____</p> <p>SAFETY LOANERS: _____</p> <p>SAFETY RENTERS: _____</p> <p>SAFETY PURCHASERS: _____</p> <p>SAFETY SELLERS: _____</p> <p>SAFETY TRADERS: _____</p> <p>SAFETY EXCHANGERS: _____</p> <p>SAFETY TRANSFERRERS: _____</p> <p>SAFETY MOVERS: _____</p> <p>SAFETY CARRIERS: _____</p> <p>SAFETY DELIVERERS: _____</p> <p>SAFETY DISTRIBUTORS: _____</p> <p>SAFETY SUPPLIERS: _____</p> <p>SAFETY SOURCES: _____</p> <p>SAFETY ORIGINATORS: _____</p> <p>SAFETY CREATORS: _____</p> <p>SAFETY DESIGNERS: _____</p> <p>SAFETY BUILDERS: _____</p> <p>SAFETY MANUFACTURERS: _____</p> <p>SAFETY PRODUCERS: _____</p> <p>SAFETY CREATORS: _____</p> <p>SAFETY INVENTORS: _____</p> <p>SAFETY DEVELOPERS: _____</p> <p>SAFETY ENGINEERS: _____</p> <p>SAFETY ARCHITECTS: _____</p> <p>SAFETY PLANNERS: _____</p> <p>SAFETY DESIGNERS: _____</p> <p>SAFETY BUILDERS: _____</p> <p>SAFETY MANUFACTURERS: _____</p> <p>SAFETY PRODUCERS: _____</p> <p>SAFETY CREATORS: _____</p> <p>SAFETY INVENTORS: _____</p> <p>SAFETY DEVELOPERS: _____</p> <p>SAFETY ENGINEERS: _____</p> <p>SAFETY ARCHITECTS: _____</p> <p>SAFETY PLANNERS: _____</p> <p>SAFETY DESIGNERS: _____</p> <p>SAFETY BUILDERS: _____</p> <p>SAFETY MANUFACTURERS: _____</p> <p>SAFETY PRODUCERS: _____</p> <p>SAFETY CREATORS: _____</p> <p>SAFETY INVENTORS: _____</p> <p>SAFETY DEVELOPERS: _____</p> <p>SAFETY ENGINEERS: _____</p> <p>SAFETY ARCHITECTS: _____</p> <p>SAFETY PLANNERS: _____</p> <p>SAFETY DESIGNERS: _____</p> <p>SAFETY BUILDERS: _____</p> <p>SAFETY MANUFACTURERS: _____</p> <p>SAFETY PRODUCERS: _____</p> <p>SAFETY CREATORS: _____</p> <p>SAFETY INVENTORS: _____</p> <p>SAFETY DEVELOPERS: _____</p> <p>SAFETY ENGINEERS: 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PRODUCERS: _____</p> <p>SAFETY CREATORS: _____</p> <p>SAFETY INVENTORS: _____</p> <p>SAFETY DEVELOPERS: _____</p> <p>SAFETY ENGINEERS: _____</p> <p>SAFETY ARCHITECTS: _____</p> <p>SAFETY PLANNERS: _____</p> <p>SAFETY DESIGNERS: _____</p> <p>SAFETY BUILDERS: _____</p> <p>SAFETY MANUFACTURERS: _____</p> <p>SAFETY PRODUCERS: _____</p> <p>SAFETY CREATORS: _____</p> <p>SAFETY INVENTORS: _____</p> <p>SAFETY DEVELOPERS: _____</p> <p>SAFETY ENGINEERS: _____</p> <p>SAFETY ARCHITECTS: _____</p> <p>SAFETY PLANNERS: _____</p> <p>SAFETY DESIGNERS: _____</p> <p>SAFETY BUILDERS: _____</p> <p>SAFETY MANUFACTURERS: _____</p> <p>SAFETY PRODUCERS: _____</p> <p>SAFETY CREATORS: _____</p> <p>SAFETY INVENTORS: _____</p> <p>SAFETY DEVELOPERS: _____</p> <p>SAFETY ENGINEERS: _____</p> <p>SAFETY ARCHITECTS: _____</p> <p>SAFETY PLANNERS: _____</p> <p>SAFETY DESIGNERS: _____</p> <p>SAFETY BUILDERS: _____</p> <p>SAFETY MANUFACTURERS: _____</p> <p>SAFETY PRODUCERS: _____</p> <p>SAFETY CREATORS: _____</p> <p>SAFETY INVENTORS: _____</p> <p>SAFETY DEVELOPERS: _____</p> <p>SAFETY ENGINEERS: _____</p> <p>SAFETY ARCHITECTS: _____</p> <p>SAFETY PLANNERS: _____</p> <p>SAFETY DESIGNERS: _____</p> <p>SAFETY BUILDERS: _____</p> <p>SAFETY MANUFACTURERS: _____</p> <p>SAFETY PRODUCERS: _____</p> <p>SAFETY CREATORS: _____</p> <p>SAFETY INVENTORS: _____</p> <p>SAFETY DEVELOPERS: _____</p> <p>SAFETY ENGINEERS: _____</p> <p>SAFETY ARCHITECTS: _____</p> <p>SAFETY PLANNERS: _____</p> <p>SAFETY DESIGNERS: _____</p> <p>SAFETY BUILDERS: _____</p> | | | | | | | | | | | |

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HEALTH, SAFETY ENGINEERING & PROPERTY PROTECTION

Section XIII SAFETY, MEDICAL AND PROPERTY PROTECTION FORMS

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Date 3-8-63
Cancels NONE

Part 1. SAFETY INSPECTION PROGRAM FORMS

INSTRUMENTS EMPLOYING RADIOACTIVE SOURCE (FORM S-4356-16)

| SAFETY INSPECTION WORK ORDER | | | | | | | | | | | |
|--|-----|------|-----|------|-----|---------|-----|------|-----|------|-----|
| INSTRUMENTS EMPLOYING RADIOACTIVE SOURCE | | | | | | | | | | | |
| THIS | | DATE | | TIME | | BY | | FOR | | BY | |
| DATE | | TIME | | DATE | | TIME | | DATE | | TIME | |
| JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
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| TEST | | | | | | RESULTS | | | | | |
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Part 1. SAFETY INSPECTION PROGRAM FORMS

Date 3-8-63
Cancels NONE

MACHINE FEED SCREWS & CONVEYOR SAFETIES (FORM S-4356-18)

| SAFETY INSPECTION WORK ORDER | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|
| MACHINE FEED SCREWS & CONVEYOR SAFETIES | | | | | | | | | | | |
| LOCATION | | | | | | | | | | | |
| DATE | | | | | | | | | | | |
| PROPERTY NO. | | | | | | | | | | | |
| SAFETY NO. | | | | | | | | | | | |
| REMARKS | | | | | | | | | | | |
| FREQUENCY CODE | | | | | | | | | | | |
| DISTRIBUTION | | | | | | | | | | | |
| INSTRUCTIONS AND PROCEDURES (INSPECT DAILY BY PRODUCTION, MONTHLY BY MAINTENANCE) | | | | | | | | | | | |
| The Production department is to check the safeties daily to determine that they are functioning properly. | | | | | | | | | | | |
| The maintenance department will make an independent monthly check to insure that the safeties are working and are in safe operating condition. Repair immediately any necessary maintenance work and record below. | | | | | | | | | | | |
| REMARKS: | | | | | | | | | | | |

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Part 1. SAFETY INSPECTION PROGRAM FORMS

Date 3 8 63
Cancels NONE

MOLD BREAKER SAFETY INSPECTION (FORM S-4356-19)

[illegible]

S-4273-M

The Firestone Tire & Rubber Company

SUBJECT TO DISCLOSURE RESTRICTION

40849

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Part 1. SAFETY INSPECTION PROGRAM FORMS

Date 3 8 63
 Cancels NONE

MOLD HOLD DOWN BOLTS (FORM S 4356 20)

| SAFETY INSPECTION WORK ORDER | | | | | | | | | | | |
|------------------------------|--|----------|--|-------------|--|---------------|--|---------------|--|----------------|--|
| MOLD BOLD DOWN BOLTS | | | | | | | | | | | |
| ITEM | | QUANTITY | | DATE ISSUED | | DATE RECEIVED | | DATE RETURNED | | DATE INSPECTED | |
| 1 | | 2 | | 3 | | 4 | | 5 | | 6 | |
| JAN | | FEB | | MAR | | APR | | MAY | | JUN | |
| JUL | | AUG | | SEP | | OCT | | NOV | | DEC | |
| JAN | | FEB | | MAR | | APR | | MAY | | JUN | |
| JUL | | AUG | | SEP | | OCT | | NOV | | DEC | |
| JAN | | FEB | | MAR | | APR | | MAY | | JUN | |
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| JAN | | FEB | | MAR | | APR | | MAY | | JUN | |
| JUL | | AUG | | SEP | | OCT | | NOV | | DEC | |
| JAN | | FEB | | MAR | | APR | | MAY | | JUN | |
| JUL | | AUG | | SEP | | OCT | | | | | |

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Part 1. SAFETY INSPECTION PROGRAM FORMS

Date 3-8-63
Cancels None

PRESSURE VESSEL & SAFETY VALVE TEST & INSPECTION (Form S-4356-21)

[illegible]



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Part 1. SAFETY INSPECTION PROGRAM FORMS

Date 3-8-63
Cancels NONE

PROPANE BULK STORAGE SAFETY INSPECTION (FORM S-4356-22)

| SAFETY INSPECTION WORK ORDER | | | | | | | | | | | |
|---|--|--|--|--|--|--|--|--|--|--|--|
| PROPANE BULK STORAGE SAFETY INSPECTION | | | | | | | | | | | |
| LOCATION | | | | | | | | | | | |
| DATE | | | | | | | | | | | |
| TIME | | | | | | | | | | | |
| INSPECTED BY | | | | | | | | | | | |
| SIGNED | | | | | | | | | | | |
| DATE | | | | | | | | | | | |
| TIME | | | | | | | | | | | |
| FIRESTONE SAFETY INSPECTION SYSTEM | | | | | | | | | | | |
| INSTRUCTIONS AND PROCEDURES (WEEKLY-MONTHLY) | | | | | | | | | | | |
| The purpose of the propane equipment safety inspection is to locate the leakage of propane around the fittings. Propane is used in Firestone Plants as a fuel for Fork lift trucks. Each truck contains fittings to which full Propane cylinders are attached and empties are removed. | | | | | | | | | | | |
| Each piece of equipment using propane is to be inspected weekly by the fire department. No record is to be kept if the test proves that there is no leakage. In case of leakage, the leak should be immediately reported to the maintenance department and the condition corrected. | | | | | | | | | | | |
| A monthly followup is made to determine if the weekly tests are being made as scheduled. | | | | | | | | | | | |
| Leaks are detected using a soap test. A soap solution applied to a leaky fitting will form bubbles thus locating the leak. Any good soap may be used and applied to the fitting with a small paint brush. | | | | | | | | | | | |
| A very satisfactory leak tester may be purchased from the Nuclear Products Company, 15635 Saranac Road, Cleveland 10, Ohio. The device is called a "Snoop". It is a small polyethylene bottle with a small tube about (12) inches long having an ID of 1/32 inch. The "snoop" is inexpensive and is useful in determining minute leaks. The liquid used is non-toxic, non-flammable, No Residue, No Chlorine, Bubbles last longer, and detects leaks on vertical surfaces. The temperature range is 270° to 200°. | | | | | | | | | | | |
| REMARKS: | | | | | | | | | | | |
| FIRESTONE SAFETY INSPECTION SYSTEM | | | | | | | | | | | |

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Part 1. SAFETY INSPECTION PROGRAM FORMS

Date 3-8-63
Cancels NONE

REPORT ON ACCIDENTS AND HAPPENINGS (FROM 5-4356-23)

| SAFETY INSPECTION WORK ORDER | | | | | | | | | | | |
|------------------------------------|--|-------|--|----------|--|------|--|------|--|------|--|
| REPORT ON ACCIDENTS AND HAPPENINGS | | | | | | | | | | | |
| ITEM | | PLANT | | LOCATION | | DATE | | TIME | | PAGE | |
| 1 | | 2 | | 3 | | 4 | | 5 | | 6 | |
| 7 | | 8 | | 9 | | 10 | | 11 | | 12 | |
| 13 | | 14 | | 15 | | 16 | | 17 | | 18 | |
| 19 | | 20 | | 21 | | 22 | | 23 | | 24 | |
| 25 | | 26 | | 27 | | 28 | | 29 | | 30 | |
| 31 | | 32 | | 33 | | 34 | | 35 | | 36 | |
| 37 | | 38 | | 39 | | 40 | | 41 | | 42 | |
| 43 | | 44 | | 45 | | 46 | | 47 | | 48 | |
| 49 | | 50 | | 51 | | 52 | | 53 | | 54 | |
| 55 | | 56 | | 57 | | 58 | | 59 | | 60 | |
| 61 | | 62 | | 63 | | 64 | | 65 | | 66 | |
| 67 | | 68 | | 69 | | 70 | | 71 | | 72 | |
| 73 | | 74 | | 75 | | 76 | | 77 | | 78 | |
| 79 | | 80 | | 81 | | 82 | | 83 | | 84 | |
| 85 | | 86 | | 87 | | 88 | | 89 | | 90 | |
| 91 | | 92 | | 93 | | 94 | | 95 | | 96 | |
| 97 | | 98 | | 99 | | 100 | | 101 | | 102 | |
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| 115 | | 116 | | 117 | | 118 | | 119 | | 120 | |
| 121 | | 122 | | 123 | | 124 | | 125 | | 126 | |
| 127 | | 128 | | 129 | | 130 | | 131 | | 132 | |
| 133 | | 134 | | 135 | | 136 | | 137 | | 138 | |
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| 301 | | 302 | | 303 | | 304 | | 305 | | | |

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Part 1. SAFETY INSPECTION PROGRAM FORMS

Date 3-8-63
Cancels None

SAFETY MANAGER'S INSPECTION REPORT (Form S-4356-24)

| SAFETY INSPECTION WORK ORDER | | | | | | | | | | | |
|------------------------------|-----|-----|-----|-----|-----|--|--|--|--|--|--|
| JAN | FEB | MAR | APR | MAY | JUN | | | | | | |
| | | | | | | | | | | | |

CHECK LIST

- Has each fired pressure vessel received internal and external inspection as required?
- Has each unfired pressure vessel received internal and external inspection as required? (See State Law, City Code, Firestone requirements)
- Has each pressure relief device been tested and inspected as required? (See State Law, City Code, Firestone requirements)
- Are Hazardous Chemicals handled as required by instructions?
- Are mold hold down bolts inspected monthly?
- Is the Safety Stop test for Mills and Calenders checked daily by Production, Monthly by Maintenance?
- Are Instruments employing radioactive Source inspected semi-annually as required by Atomic Energy Commission Regulations?
- Is fire protective equipment inspected monthly?
- Are explosive tests on sewer manholes checked weekly?
- Is Hoisting Equipment Inspected monthly?

INSTRUCTIONS AND PROCEDURES (INSPECT ANNUALLY/SCHEDULE FOR NOVEMBER)

Before making this report the Plant Safety Manager shall make an inspection tour of the plant with the plant engineer to determine the effectiveness of the Safety Program. He shall then review reports and specifications indicated above and verify that inspections are carried out. Where inspections have not been made a full report on such items must be attached.

SAFETY MANAGER'S REPORT (use other side for additional space or attach additional report as required above)

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Part 1. SAFETY INSPECTION PROGRAM FORMS

Date 3-8-63
Cancels None

SAFETY SHOWER AND EYE WASH FOUNTAIN (Form S-4356-25)

[illegible]



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Part 1. SAFETY INSPECTION PROGRAM FORMS

Date 3-8-63
Cancels None

SAFETY RELIEVING DEVICE-TEST REPORT (Form S-4356-26)

1 2 3 4 5 6 7 8 9 10 11 12

MONTH

DATE TESTED

SAFETY INSPECTION WORK ORDER

SAFETY RELIEVING DEVICE - TEST REPORT

FROM: _____

TO: _____

DATE: _____

TIME: _____

TESTED BY: _____

DATE LAST TESTED: _____

SET PRESSURE: _____

NEW SET PRESS (if changed): _____

CONDITION: _____

Leaking _____

Fouled _____

To Unit _____

To Shop _____

FROM SPARE STOCK: _____

SET PRESSURE: _____

TEST USED: _____

STANDARD: _____

INSTRUCTIONS AND PROCEDURE (INSPECT ANNUALLY)

Each device should be checked for condition of flanges, pitting, roughening and decrease in width of seating surface when dismantled. Check springs, bellows, and position of the set screws and openings in the bonnet. Examine inlet and outlet nozzles for corrosion and foreign material. Inspect condition of external surfaces for corrosion or mechanical damage. Examine body wall thickness. Inspect valve components and materials, to check against identification tag and specification card. Thoroughly clean entire device.

REMARKS: _____

DATE: _____

INSPECTED BY: _____

DISTRIBUTION

Akron Eng. Dept.
Plant Engineer
Mr. Shop Foreman
Safety Engineer

FREQUENCY CODE

1 JANUARY
2 FEBRUARY
3 MARCH
4 APRIL
5 MAY
6 JUNE
7 JULY
8 AUGUST
9 SEPTEMBER
10 OCTOBER
11 NOVEMBER
12 DECEMBER

MAKE SET PRESS USE

ORIFICE Inlet Outlet

MAKE Style Body Trip

Special

S-4273-M

The Firestone Tire & Rubber Company

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Part 1. SAFETY INSPECTION PROGRAM FORMS

Date 3-8-63
Cancels NONE

SEWER MANHOLES EXPLOSION TESTS (FORM S-4356-27)

[illegible]

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Part 1. SAFETY INSPECTION PROGRAM FORMS

Date 3-8-63
Cancel None

SAFE HANDLING OF HAZARDOUS MATERIALS (Form S-4356-28)

[illegible]



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Part 1. SAFETY INSPECTION PROGRAM FORMS

Date 3-6-63
Cancels NONE

TRUCKS, HAND LEAD TRUCKS, TRACTORS (FORM S-4356-29)

SAFETY INSPECTION WORK ORDER

TRUCKS, HAND LEAD TRUCKS, TRACTORS

TRUCK NO. _____

MAKE A SEPARATE REPORT FOR EACH TRUCK

NAME _____

1. Is Steering Gear in good condition?
2. Is Horn in good condition - Does it give good warning?
3. Is Safety Rule Card clean and in good condition?
4. Does Lift Mechanism perform satisfactory under load?

POWER TRUCKS AND TRACTORS ONLY

1. Are there proper knuckle guards on steering lever?
2. Are there adequate foot and leg guards?
3. Is Pan enclosed adequately?
4. Distance required to stop after brake is applied. _____ Ft.

INSTRUCTIONS AND PROCEDURES (INSPECTION SEE BELOW)

For each truck to be inspected answer the questions above; make such minor repairs as are necessary. Report large repair items to the Foreman or Master Mechanic. Remarks should cover the details of the repairs and the parts replaced.

Inspection to be made each time truck is in shop for maintenance. If truck is not brought into shop for maintenance it must be brought in once bi-monthly for inspection.

REMARKS: (Adjustments made as a result of this inspection also Detail Parts Replacement)
(Report suggestions for design improvements here.)

DATE _____

INSPECTED BY _____

DATE _____

PIRESTONE SAFETY INSPECTION SYSTEM

FORM NO. S-4356-1 -29



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Part 1. SAFETY INSPECTION PROGRAM FORMS

Date 3-8-63
Cancels NONE

TUBE CURING PRESSES INSPECTION REPORT (FORM S 4356-30)

| SAFETY INSPECTION WORK ORDER | | | | | | | | | | | |
|---|--|--|--|--|--|--|--|--|--|--|--|
| TUBE CURING PRESSES INSPECTION REPORT | | | | | | | | | | | |
| DATE: 0 0 2 0 4 | | | | | | | | | | | |
| ITEM: 1 2 3 4 | | | | | | | | | | | |
| LOCATION: 1 2 3 4 | | | | | | | | | | | |
| DATE COMPLETED: 1 2 3 4 | | | | | | | | | | | |
| TYPE: 1 2 3 4 | | | | | | | | | | | |
| PRESS NO.: | | | | | | | | | | | |
| CONDICTION AND REPAIRS: | | | | | | | | | | | |
| FREQUENCY CODE: | | | | | | | | | | | |
| DISTRIBUTION: | | | | | | | | | | | |
| INSPECTED BY: | | | | | | | | | | | |
| DATE: | | | | | | | | | | | |
| INSTRUCTIONS AND PROCEDURES (INSPECT QUARTERLY) | | | | | | | | | | | |
| REMARKS: | | | | | | | | | | | |
| FIRESTONE SAFETY INSPECTION SYSTEM | | | | | | | | | | | |
| FORM NO. S-4356 -30 | | | | | | | | | | | |

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Part 1. SAFETY INSPECTION PROGRAM FORMS

Date 3-8-62
Cancel NONE

TRANSFORMER INSPECTION (LIQUID FILLED) (FORM S 4356-31)

| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| JAN | | | | | | | | | | | | |
| FEB | | | | | | | | | | | | |
| MAR | | | | | | | | | | | | |
| APR | | | | | | | | | | | | |
| MAY | | | | | | | | | | | | |
| JUN | | | | | | | | | | | | |
| JUL | | | | | | | | | | | | |
| AUG | | | | | | | | | | | | |
| SEP | | | | | | | | | | | | |
| OCT | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | |
| DEC | | | | | | | | | | | | |

SAFETY INSPECTION WORK ORDER

ITEM _____
TRANSFORMER INSPECTION (LIQUID FILLED)
LOCATION _____
DATE TESTED _____
SECURITY CODE _____

VIA _____
TYPE _____ \$ IMP. _____

NVA _____ RCL VOLTS _____ SEC. VOLTS _____
HTG. _____ TYPE _____

REMARKS:

- 1. Oil Test (MIL) 22KV Dielectric strength for safe operation.
- 2. Oil Color (Straw, Yellow, Light Amber, Dark Amber, Black).
- 3. Oil Level.
- 4. Max. Oil Temp. (should not exceed 80°C). For Self Cooled 47°C for water cooled.
- 5. Condition of Bushings (Check for cracks, leaking resins, excessive dirt).
- 6. Condition of Paint.
- 7. Condition of Ground Connections.
- 8. Condition of Airflow & Ventilation.
- 9. Condition of Emergency Relief Discharge.
- 10. Cleanliness.

INSTRUCTIONS AND PROCEDURES (INSPECT ANNUALLY)

Refer to Electrical Standards Manual Section 0.2 pages 1, 2, 3 for detailed inspection instructions.
Report all maintenance work done as a result of this inspection in the space provided below.

MAINTENANCE WORK PERFORMED

REMARKS:

DISTRIBUTION:
Aircraft Elec-Eng-Mat
Plant Elec-Eng
Master Mechanic

INSPECTED BY: _____ DATE: _____

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Date 3 8 63
Cancels NONE

Part 1. SAFETY INSPECTION PROGRAM FORMS

VULCANIZERS SAFETY INSPECTION (FORM S 4356 32)

[illegible]

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Part 1. SAFETY INSPECTION PROGRAM FORMS

Date 3-8-63

Cancels **None**

VENTILATION - POST CEMENT UNITS (Form S-4356-33)

[illegible]



Date 3-8-63
Cancel NONE

[illegible]

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Part 1. SAFETY INSPECTION PROGRAM FORMS

Date 3-8-63
Cancel NONE

WINDOW WASHERS LAG SCREWS (FORM S-4356-35)

| SAFETY INSPECTION WORK ORDER | | | | | | | | | | | |
|---|--|----------|--|------------|--|------------|--|---------------|--|-----------|--|
| WINDOW WASHERS LAG SCREWS | | | | | | | | | | | |
| ITEM | | QUANTITY | | UNIT PRICE | | TOTAL AMT. | | DATE RECEIVED | | DATE PAID | |
| 1 WINDOW WASHER | | 1 | | | | | | | | | |
| 2 WINDOW WASHER | | 2 | | | | | | | | | |
| 3 WINDOW WASHER | | 3 | | | | | | | | | |
| 4 WINDOW WASHER | | 4 | | | | | | | | | |
| <p>INSTRUCTIONS AND PROCEDURES (INSPECT ANNUALLY)</p> <p>Inspect all the Window washers lag screws (Remove screw completely for inspection) at the following locations for looseness, rust, and wood rot.</p> <p>NOTE: Use 3/8" lag screw cadmium plated, original screw length, top 2 1/2", bottom 3". Increase length to suit or relocate. Install screws vertically on 2 7/8" centers and to have a spacing of 3/8" between the bottom of the screw head and the window casing.</p> <p>REMARKS: (List Locations Inspected & All Maintenance work)</p>

 | | | | | | | | | | | |
| <p>DISTRIBUTION:</p> <p>PLANT ENGINEER</p> <p>MASTERS TECHNICIAN</p> <p>Safety Engineer</p> | | | | | | | | | | | |
| <p>INSPECTED BY:</p> <p>DATE:</p> | | | | | | | | | | | |

~~S-4273-M~~

The Firestone Tire & Rubber Company

SUBJECT TO DISCLOSURE RESTRICTION

40865

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Part 1. SAFETY INSPECTION PROGRAM FORMS

Date 3-8-63
Cancels None

FIRESTONE JACKET MOLDS (Form S-4356-36)

[illegible]



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Part 1. SAFETY INSPECTION PROGRAM FORMS

Date 3-8-63
Cancels None

SHEAR-STRIP PRESSES (FORM S-4356-37)

| MONTHS | | | | | | | | | | | | SAFETY INSPECTION WORK ORDER | | | | | | | | | | | |
|----------------------------|--|--|--|--|--|--|--|--|--|--|--|------------------------------|--|--|--|--|--|--|--|--|--|--|--|
| 1 2 3 4 5 6 7 8 9 10 11 12 | | | | | | | | | | | | JUL AUG SEPT OCT NOV DEC | | | | | | | | | | | |
| JAN FEB MAR APR MAY JUNE | | | | | | | | | | | | JUL AUG SEPT OCT NOV DEC | | | | | | | | | | | |
| SHEAR-STRIP PRESSES | | | | | | | | | | | | SHEAR-STRIP PRESSES | | | | | | | | | | | |
| ITEM | | | | | | | | | | | | ITEM | | | | | | | | | | | |
| 1 PLANT | | | | | | | | | | | | 1 PLANT | | | | | | | | | | | |
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