HAZARD COMMUNICATION TRAINING

4-hour course in accordance with 29 CFR1910.1200

INSTRUCTOR MANUAL




CPWR THE CENTER FOR CONSTRUCTION RESEARCH AND TRAINING

Revised 2013

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CPWR

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- James August, MPH, Curriculum development
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Notes for instructors

Course delivery and classroom management

This is a four hour hazard communication course that satisfies the general training requirements of OSHA's hazard communication standard 29CFR1910.1200. If this course is not tailored for participants' specific worksite, some additional training will be required at their worksite, such as what chemicals are in their work area, where Safety Data Sheets (SDSs) and the employer's written Hazcom program are located.

The course is based on good adult education techniques, like involving students in small group activities. This approach will foster participation from the class and allow students to draw on their work experience to learn material and solve problems.

We encourage you to be an instructor who *facilitates* the course. Try to use the activities and questions included in the presentations to draw out students' experiences related to chemical use in the workplace and then to help them fill in the missing pieces.

If you are an experienced trainer, you should expect to study, review and prepare for this course for at least two to four hours per hour you will be teaching. There is a great deal of information in this course, including a robust set of instructor's notes embedded in the PowerPoint. The PowerPoint was designed in a new format called "Assertion-Evidence." It is advisable to review the slides several times to become familiar with them and how the assertion evidence format works. You may also want to review supporting material, such as CPWR's 40-hour Site Worker course to brush up on hazard controls, chemistry, units of measurement, etc.

Go over the student manual with your students. Hopefully, it will serve as a reference they can use after the course. It expands on the material presented in the PowerPoint slides. It also contains activities and provides space to record answers. Encourage them to write answers in all of the spaces because it is a good way to learn the material. We have tried to make this easier for you. Every time you see the blue toolbox icon, it means there is an activity in their student manual that they should do. There is a glossary and the entire OSHA Hazcom standard in the appendices.

Allocated time

CPWR considers four hours to be the minimum time needed to effectively facilitate this course, including activities and report backs. If the class has a particular interest or gets a useful discussion going, adjust time as you see fit. There is no minimum hazcom training time under the standard but, as stated by OSHA, "The employer, however, maintains the responsibility to ensure that their employees are adequately trained and are equipped with the knowledge and information necessary to conduct their jobs safely."

Course delivery

Work hard to get the students involved; this may be the only opportunity they have to learn about chemicals on their jobs. If you find you are running short on time, you may have to do some of the following to manage the time:

- Eliminate one or more activities
- Assign activities so everything is covered, but no item is duplicated among the groups. (e.g. if there are 15 questions and five participants per group, have each group member work on only 3 questions each)
- Shorten report back time by having each group only give one response and then ask the class if "anyone has anything to add."

Training materials for course

AV and classroom equipment

Laptop or PC for running presentations
Projector/screen
Remote slide advancer
Two easels and paper
Easel paper (graph and plain)
Markers (various colors for activities and discussion facilitation)
CPWR Hazard Communication Instructors Manual
CPWR Hazard Communication PowerPoint presentation
Wireless internet access (optional)

Materials for each student

CPWR Hazard Communication Student Manual
NIOSH Pocket Guide (optional)
Site-specific SDS (if possible, if not five are provided in Appendix B)

Materials for each group

Note paper
Pens/pencils
Markers (various colors for activities) one set per group

Assertion evidence presentation format

The PowerPoint follows the assertion evidence approach. Familiarize yourself with the assertion evidence method and structure of the PowerPoint slides. The slides will have a question or statement in the title (assertion) that will be supported by visual evidence (photo or graph, etc.) This approach gets away from bullets as much as possible. It just makes an assertion and backs it up with evidence. Many of the slides start with a question. Give students time to respond before presenting them with the answers by clicking.

The key to this approach is to deliver the assertion just as it is written so the student will be hearing and seeing the same message. This avoids the standard, poor delivery of most presentations, which requires the student to choose whether he or she wants to focus on what the instructor is saying or to read the slide. They can't do both. Research shows we don't multitask well at all.

The slides have robust instructor's notes to aid your delivery of the module, to provide background on topics, and to help you provide answers to questions posed in the slides or by students. Information inside brackets is intended as guidance to you, the instructor.

The following text was developed from the article, **"Rethinking the Design of Presentation Slides: The Assertion-Evidence Structure"** which may be found, along with other assertion evidence training aids, at http://www.writing.engr.psu.edu/slides.html.

Four key assumptions apply when using the assertion-evidence presentation format. These assumptions:

1. Slides are an appropriate visual aid for the presentation. Too often, slides are projected when no visual aid would better serve the presentation. You can darken the screen during a presentation by hitting "B" for black. Do this when you want the class to look and listen to you. Hit B again when you want to bring back the image. "W" works the same for a white screen.
2. The success of the presentation hangs on the audience understanding the content.
3. The slides projected during the presentation cannot afford to have as much text on them as the handout does, because the audience is not only reading the projected slides, but listening to the speaker as well.
4. Finally, the primary purpose of the slides is to help the audience understand the content, not to provide talking points for the speaker.

Group discussions and activities

This course contains several small group activities and a few small thought provoking questions/activities. There is not much room for error when understanding the hazards and risks of chemicals. However, some of the questions are open-ended and may have different solutions. It is important to allow students to present their solutions. As long as they defend their solutions well, it may just be one of many correct ways of dealing with a problem. As the instructor, you are the judge of the solutions and the evidence. Also, it is advisable that during your preparation to deliver the course, you complete each activity in the student manual on your own, providing your own answers to the exercises. This will give you a better understanding of the course and give you at least one "correct" example you created to use when presenting the course. Keep the student manual that you completed as your own, as well as the instructor manual, and use them to record notes and improvements or your own methods for presenting the course.

In this instructor guide, one selected answer is provided to each question.

Hazard Communication Training

4-hour course in accordance with 29 CFR1910.1200

Icebreaker
In your group (or as the whole class) discuss chemicals that you are exposed to on your job and discuss the harm they can cause. Do you know of any specific incidents involving chemicals?

This course is delivered in 8 sections:

1. Course introduction
2. Hazard Communication Standard (HCS) overview
3. Review of common health effects
4. Chemical overview
5. Measurement and exposure limits
6. Other ways of communicating hazards
7. Controlling hazards
8. Emergencies and first aid

After completing this course you will be able to:

1. Discuss the 5 key elements of OSHA's Hazard Communication Standard (Hazcom).
2. Describe your rights under OSHA's Hazcom standard.
3. Identify the new OSHA label symbols and explain what each means.
4. Describe the 4 routes of entry for chemicals and give an example of a chemical known to enter the body through each.
5. State three ways to find information about chemicals found on your jobsite.
6. Describe several methods to control chemical exposures and rank them for greater worker protection.
7. Using a product's safety data sheet, assess whether it is flammable, heavier than air and has an OSHA PEL.

Figure 1. Masonry instructor checking a Safety Data Sheet.

Section 1: Course Introduction

The OSHA Hazard Communication standard gives you the right to understand about the chemical hazards on your job and ways to protect yourself.

What this course will not do

This course will not train you to clean up spills and releases.

If you believe you have an emergency situation, follow your employer's emergency response plan to evacuate the area and notify someone who is authorized to respond. If your employer does not have an emergency response plan, tell your coworkers and get out of the area and notify the first supervisor you can.

This course will also not teach you about the specific chemical hazards on your job site. Your employer must do that.

Hazcom training will prepare you to find and use information about chemicals on your job, as well as prepare you to identify spills and releases of hazardous chemicals and to report them to qualified response personnel.

Activity 1: Test your group's knowledge of Hazcom

Time for activity: 10 minutes (5 for group work and 5 for report back)

Objective: The goal of this activity is to allow the instructor to determine the background knowledge of the students.

Task: In your groups, work together to answer the questions. The instructor will go over the correct answers.

True or False

1. The standard requires all employers to provide workers with information about the hazardous chemicals to which they are exposed. — True

2. Employers are required to provide workers with a safety data sheet (SDS) within the work shift in which it is requested. — True

3. Chemical importers, manufacturers, and distributors initiated the OSHA Hazard Communication standard because they were concerned about liability. — False

4. Employers are required to provide annual training in hazard communication. — False

Fill in the blank using the answers to the right.

5. How many workers die each year from occupational injuries? — b.

6. How many workers die each year from occupational diseases caused by chemical exposures? — e.

7. How many chemical-specific standards does OSHA enforce? — a.

8. How many chemical products are used in the workplace? — e.

Answers

a. 500
b. 5,000
c. 10,000
d. 50,000
e. > 50,000

Every day around four construction workers die on the job.

This shows the deaths on construction jobs in 2012 as tracked by CPWR:

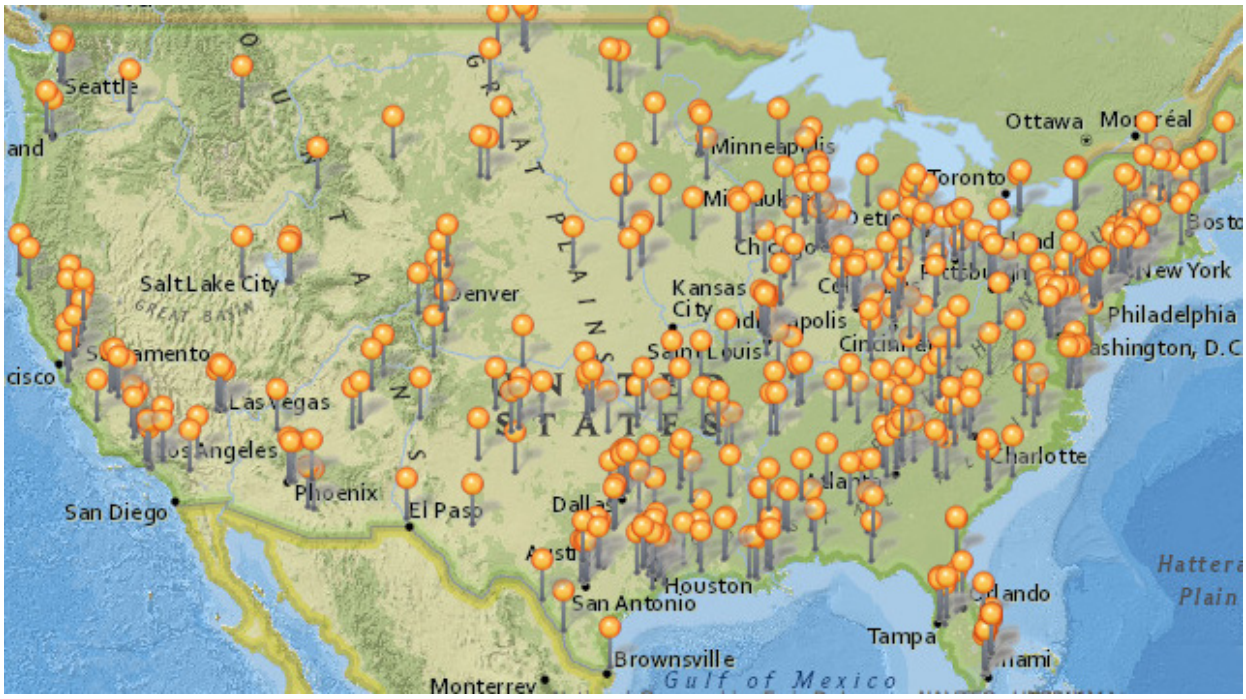


Figure 2

Section 2: Hazard Communication Standard Overview

What led up to OSHA developing the Hazcom Standard in 1983?

In 1952 and 1969, the Cuyahoga River caught fire. In fact, At least 13 fires have been reported on the Cuyahoga River beginning in 1868. The largest river fire in 1952 caused over $1 million in damage to boats and a riverfront office building. Fires erupted on the river several more times before June 22, 1969, when a river fire captured the attention of Time magazine, which described the Cuyahoga as the river that “oozes rather than flows” and in which a person “does not drown but decays”. The 1969 Cuyahoga River fire helped spur an avalanche of water pollution control activities, resulting in the Clean Water Act and the creation of the federal Environmental Protection Agency. (Source: Wikipedia)

Unions and environmental groups led the fight for protections from hazardous chemicals.

In 1977, 60 workers at a chemical plant in California making the pesticide DBCP (1,2-dibromo-3-chloropropane) were found to be sterile. During lunch time and breaks, employees started talking about the problems they had trying to start a family. They started to notice no employees in their particular area of the plant were successful. These employees went to their doctors, and found out they were all sterile. Several years earlier, a University of California researcher found that DBCP was a reproductive hazard. This was published information but workers were never informed about this particular hazard. Fortunately for these workers, the effects were not long term. The DBCP case triggered legislative hearings which resulted in California passing a new statute in the California Labor Code in 1981. This statute is commonly known as the Hazard Communication Regulation. The new regulation required the California Department of Industrial Relations to create a list of hazardous substances. It required manufacturers to develop material safety data sheets (SDS) for hazardous substances which they manufactured and to provide a copy of the SDS to employers who purchased the hazardous substances from them.

State chemical "right-to-know" laws led to the original OSHA Hazcom standard in 1983.

Why is the hazard communication standard important? (Discuss this in your group.)

Hazcom standards help workers:

- Reduce their risks to chemicals
- Avoid dangerous chemicals
- Obtain proper education about chemicals
- Select proper PPE

32 million workers are potentially exposed to chemicals according to OSHA.

Roughly one-quarter of workplace diseases and injuries are caused by chemicals, according to the International Labor Organization

Hazcom was the second most cited standard in FY 2012. There were 4,696 citations.

The Hazard Communication Standard is also known as:

- Hazcom
- Right to Know
- OSHA 29 CFR 1910.1200
- OSHA 29 CFR 1926.59 (construction)

OSHA describes the HCS as a largely performance-oriented standard that gives employers the flexibility to adapt the rule to the needs of the workplace, instead of having to follow specific, rigid requirements. The Hazard Communication Standard (HCS) is based on a simple concept: workers have both a need and a right to know the identities of the chemicals they are exposed to and the hazards associated with these chemicals. They also need to know what protective measures are available to prevent adverse effects from occurring. The HCS is designed to provide employees with the information they need.

Knowledge acquired under the HCS will help employers provide safer workplaces for their workers. When employers have information about the chemicals being used, they can take steps to reduce exposures, substitute less hazardous materials, and establish proper work practices. These efforts will help prevent the occurrence of work-related illnesses and injuries caused by chemicals.

The HCS addresses evaluating hazards and communicating the findings to workers. Evaluation requires the professional judgment of experienced experts. That's why the HCS is designed so that employers who simply use chemicals, rather than produce or import them, are not required to evaluate the hazards of those chemicals. Hazard determination is the responsibility of the producers and importers of the materials. Producers and importers of chemicals are then required to provide the hazard information to employers who purchase their products.

Employers who don't produce or import chemicals need only focus on those parts of the rule that deal with establishing a workplace program and communicating information to their workers. This course is a general guide for such employers to help them determine what's required under the rule. It is not a substitute for the regulatory requirements, but rather provides a simplified outline of the steps an average employer would follow to meet those requirements.

OSHA has a separate Hazcom standard for construction, 1926.59, but it is identical to 1910.1200.

This is the whole standard: "The requirements applicable to construction work under this section are identical to those set forth at 1910.1200."

OSHA revised its standard to be part of the Global Harmonization System (GHS), effective 5-25-12.

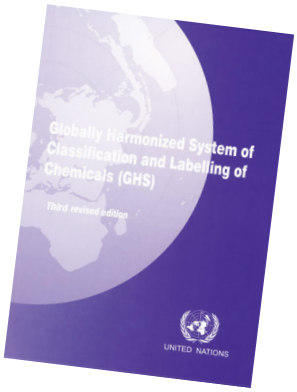


Figure 3

The GHS, first adopted by the Sub-Committee on the Globally Harmonized System of Classification and Labeling of Chemicals (SCEGHS) in December 2002, is an initiative to establish international consensus on criteria for classifying chemical hazards for international distribution, and to create consistent requirements for SDSs. It is a common approach to defining and classifying hazards, and communicating information on labels and safety data sheets. There are 16 sections in the safety data sheets. The GHS provides the underlying basis for the establishment of national, comprehensive chemical safety programs. Its target audience includes workers, consumers, transport workers, and emergency responders.

OSHA is allowing a phase-in period for the requirements.

- December 1, 2013: Employers must train workers on the new label and SDS format
- June 1, 2015: Manufacturers, importers and employers must implement all provisions, except:
- December 1, 2015: GHS-compliant shipping labels must be used
- June 1, 2016: Employers must implement their updated Hazcom programs

From OSHA's website: "During the phase-in period, employers would be required to be in compliance with either the existing HCS or the revised HCS, or both. OSHA recognizes that hazard communication programs will go through a period of time where labels and SDSs under both standards will be present in the workplace. This will be considered acceptable, and employers are not required to maintain two sets of labels and SDSs for compliance purposes."

Why was GHS created?

Before global harmonization, there were many different hazard communication regulations in place throughout the world. This caused confusion for workers who traveled to different countries and tremendous difficulty and extra costs for multi-national chemical manufacturers who needed to comply with a host of labeling requirements.

What are the five key elements in the OSHA Hazcom standard?

1. Employers must have a written Hazcom Program.
2. Containers must be labeled and labels must follow a consistent format.
3. SDSs must be available for hazardous substances in the workplace.
4. Workers must be trained.
5. Employers must have an updated chemical inventory.

Hazcom programs must have all of these parts.

Figure 4

Written Hazard Communication Program, First major requirement of OSHA's Hazcom Standard, 1910.1200 (e)

What is a Hazcom Program?

Employers must develop, implement, and maintain at the workplace a written, comprehensive Hazcom program. A program is the employer's procedure for meeting the requirements of a particular regulation, in this case, the Hazcom regulation. Workers have the right to review the Hazcom program on work time and to ask questions about it! A written hazard communication program ensures that all employers receive the information they need to inform and train their workers properly and to design and put in place worker protection programs. It also provides necessary hazard information to employees, so they can participate in, and support, the protective measures in place at their workplaces.

Often during construction there is more than one employer working on the site at the same time. In that case all employers must provide information to one another about the hazardous chemicals they are using. This sharing of information helps prevent worker exposure to chemical hazards from another employer. One important thing to remember is that the Hazcom standard gives workers the right to information concerning chemicals in their work area, not just ones they work with directly.

The written Hazcom program must be available at the job site and must include the following information:

- A list of the hazardous chemicals known to be present
- The methods the employer will use to inform workers about labels and SDSs
- The methods the employer will use to inform employees of the hazards of non-routine tasks
- Methods the employer will use to provide the other employers on-site access to SDSs on multi-employer sites

At **multiple employer** sites, like almost all construction sites, written hazard communication programs must:

- Explain how SDSs will be provided to other employers
- List the methods employers will use to inform other employers of measures taken to protect workers during normal operating conditions and in foreseeable emergencies
- Explain how employers will inform other employers of the labeling systems being used

Workers have rights under Hazcom!

You have the right under OSHA's Hazcom standard to:

- Review the written program.
- Receive information regarding hazardous substances.
- Have your physician or union rep receive information on your behalf.
- Exercise your rights without getting fired or other punishment.

Labels, the second major requirement under the OSHA Hazcom standard, are found at 1910.1200(f)

OSHA now requires that labels contain all four elements below, product identifier and supplier identification:

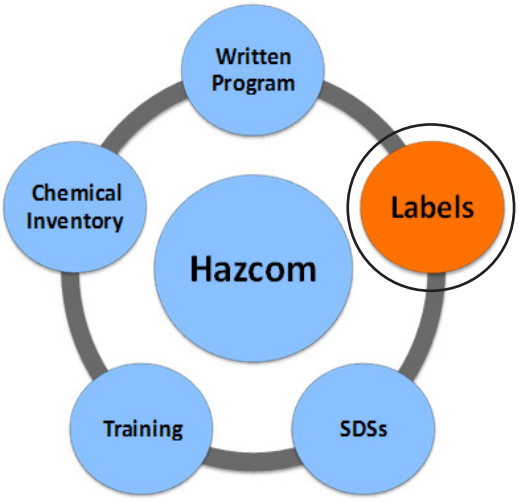


Figure 5

1. **Signal word** means a word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label. The signal words used are "danger" and "warning." "Danger" is used for the more severe hazards, while "warning" is used for the less severe.
2. **Hazard statement** means a statement assigned to a hazard class and category that describes the nature of the hazard(s) of a chemical, including, where appropriate, the degree of hazard.
3. **Hazard pictograms** means a composition that may include a symbol plus other graphic elements, such as a border, background pattern, or color, that is intended to convey specific information about the hazards of a chemical. Eight pictograms are designated under this standard for application to a hazard category.
4. **Precautionary statement** means a phrase that describes recommended measures that should be taken to minimize or prevent adverse effects resulting from exposure to a hazardous chemical, or improper storage or handling.

Additional information must be included on labels.

1. Product Identifier is the name or number used for a hazardous chemical on a label or in the SDS
2. Supplier Identifier is the name, address, and telephone number of the chemical manufacturer, importer, or other responsible party
3. Supplemental Information is any additional information

One of two signal words is required on labels to emphasize hazard. Which communicates greater hazard?

[X] Danger [ ] Warning

Labels must also contain standard precautionary statements to describe how to prevent harm. Example Precautionary Statements:

- "Only use non-sparking tools"
- "Store in a cool, well ventilated and locked place"
- "Do not breathe vapors"
- "Wear protective gloves"

Let's Review Figure 1, an example label provided by OSHA

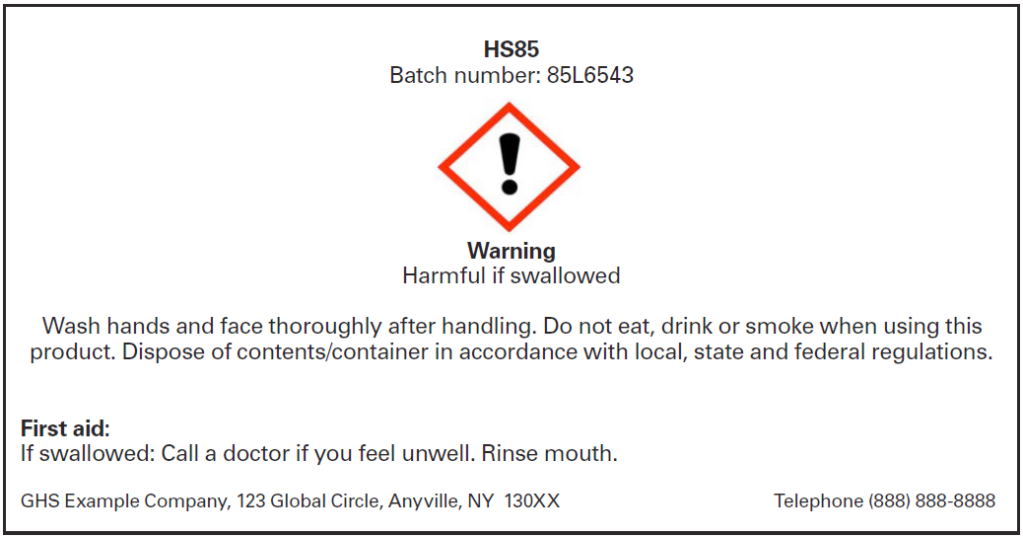


Figure 6

There are 9 symbols called pictograms that we will discuss.

Figure 7

The top row are physical hazards and the bottom row are health hazards, except for the final environmental pictogram.

Although these aren't required by OSHA until June 1, 2015, they are showing up now because U.S. companies doing business overseas are meeting the GHS requirements in place throughout the world.

Pictogram Name	Pictogram	Chemicals covered
Flame		Flammables Self Reactives Pyrophorics Self-heating Emits Flammable Gas Organic Peroxide
Oxidizer		Oxidizers
Exclamation Mark		Irritant Dermal Sensitizer Acute Toxicity (harmful) Narcotic Effects Respiratory Tract Irritation
Exploding Bomb		Explosives Self Reactives Organic Peroxides
Corrosion		
Gas Cylinder		Gases under pressure
Health Hazard		Carcinogen Respiratory Sensitizer Reproductive Toxicity Target Organ Toxicity Mutagenicity Aspiration Toxicity
Skull and Crossbones		Acute Toxicity (severe)
Environmental pollutant		Part of GHS, but not 1910.1200. OSHA does not have jurisdiction over environmental matters

Group Exercise: Match pictograms with their meanings

Without looking at the previous page, write the appropriate letter for the pictogram that corresponds to each chemical category.

D	Flammables
F	Narcotic effects
C	Oxidizers
D or E*	Self reactives
D	Self-heating
F	Irritant
D	Organic peroxides
E	Explosives
G	Gases under pressure
B	Carcinogen
F	Dermal sensitizer
F	Acute toxicity (harmful)
F	Respiratory tract irritation
D or E*	Self Reactives
H	Corrosives
B	Respiratory sensitizer
B	Reproductive toxicity
B	Target organ toxicity
B	Mutagen

*There are two broad categories of self-reactives: those that will explode and those that will burn. If heating may cause an explosion, the signal word must be danger. If the signal word is warning, the chemical can still catch on fire with enough heating, but it won't explode.

If you pour anything into a container it must be labeled unless you are going to use it immediately and control it.

Figure 8

Safety Data Sheets, third major requirement of OSHA's Hazcom standard 1910.1200 (g)

The key term has changed from "Material Safety Data Sheet" to "Safety Data Sheet."

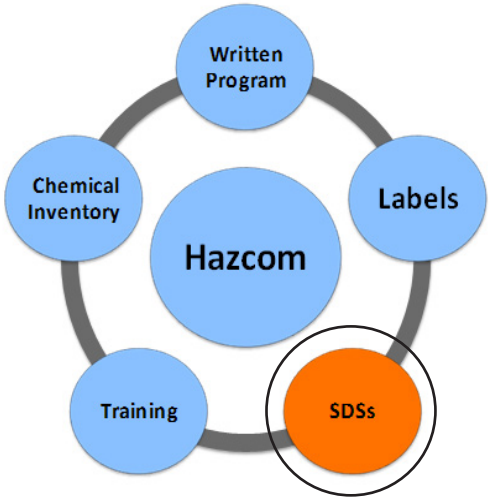


Figure 9

Safety Data Sheets must use a format with 16 sections, based on ANSI Z400.1.

1. Identification includes the product identifier, the name of the manufacturer or distributor along with the phone number and an emergency number. It also lists the recommended use of the product as well as restrictions.
2. Hazard(s) identification includes all the dangers about the chemical.
3. Composition/information on ingredients lists the different chemicals in the product and any trade secret claims.
4. First-aid measures describe the important symptoms, immediate or delayed health effects, and required treatment.
5. Fire-fighting measures list the proper ways to extinguish fires, the equipment, and chemical hazards from fire.
6. Accidental release measures explain the emergency procedures, protective equipments and proper methods of containment and cleanup.
7. Handling and storage describe precautions for safe handling and storage, including other chemicals that are not compatible with the product.
8. Exposure controls/personal protection lists OSHA's Permissible Exposure Limits, Threshold Limit Values along with appropriate engineering controls and personal protective equipment
9. Physical and chemical properties list the product's characteristics such as vapor density, flash point or explosive limits.
10. Stability and reactivity refer to the chemical's stability and the possibility of hazardous reactions.
11. Toxicological information includes the ways the chemical can enter the body the various health effects it can cause.
12. Ecological information refers to damage the chemical can cause to the environment but is not enforced by OSHA.
13. Disposal considerations cover possible dangers when disposing the chemical but is not enforced by OSHA.
14. Transport information concerns potential hazards when transporting the chemical but is not enforced by OSHA.
15. Regulatory information is not enforced by OSHA.
16. Other information includes the date the SDS was prepared or the last revision.

Whenever the employer receives a new or revised SDS that could impact your health, you must be informed within 30 days after receipt.

OSHA requires that, “Such information shall be provided to employees on a timely basis, not to exceed 30 days after receipt, if the new information indicates significantly increased risks to, or measures necessary to protect, employee health as compared to those stated on a material safety data sheet previously provided.”

Activity: Reviewing an SDS

Time for activity: 15 minutes (10 for group work and 5 for report back)

Objective: The goal of this activity is to practice reviewing a SDS. A SDS is one of the main tools in hazard communication. This activity will allow you to review a SDS on a chemical commonly found on construction jobs. There are five SDSs in Appendix B.

Task: Take a few minutes to review and become familiar with your assigned SDS. In your group, work together to answer the following questions about the provided SDS. Select a spokesperson to report back your group's answers to the class. Note to instructor: these are actual exposures for the specific task noted.

Note to instructor: these are actual exposures for the specific task noted.

Trade	Task	Product	Chemical of Concern	Available Exposure Data
Carpenter	Coating wood	MINWAX Fast Drying Polyurethane	Mineral spirits or Stoddard solvent	31 ppm (15-minute sample)
	Gluing	Loctite PL300 Foamboard Construction Adhesive	Respirable silica	<0.025 mg/m^3
Painter	Applying Paint	Sherwin Williams PRO INDUSTRIAL™ Multi-Surface Acrylic Eg-Shel	2-Butoxyethanol	0.04 to 367 ppm
Sheet Metal Worker	Duct installation	3M Fastbond 900 Sealer	n-hexane	0.3 ppm
Masonry	Repair joints or seal cracks	Sikaflex Crack Flex Sealant	Isocyanate	<0.001 to <0.002 ppm
Roofers	Coal tar application	Durapax Coal Tar Roofing Pitch	Coal tar pitch volatiles	0.14 to 1.93 mg/m^3

1. What health effects may be experienced when using this product?

Answers in Appendix: Pages B- 34 through B-35

2. Are exposures likely to be over the OELs? The PELs?

3. Is your product combustible? Flammable?

4. Are there additional chemicals that you are concerned about?

Employee Information and Training

Fourth major requirement of OSHA's Hazcom Standard, 1910.1200 (h)

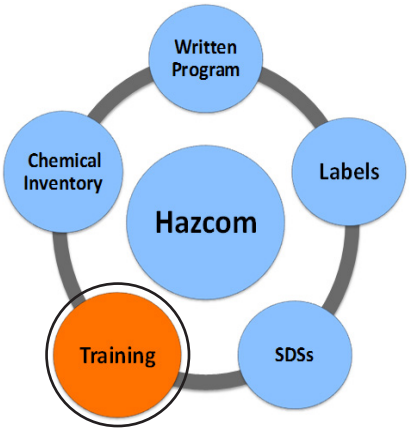


Figure 10

Employers shall provide employees with effective information and training on hazardous substances in their work area at the time of their initial assignment, and whenever a new hazard is introduced into their work area. In other words, the employer is legally not allowed to let workers work with a chemical they know nothing about!

Workers must be trained on:

- The Hazard Communication Standard and its requirements
- Any operations in their work area where hazardous substances are present
- Physical and health hazards of the substances in the work area

Workers must also be trained on:

- Methods and observations that may be used to detect the presence or release of a hazardous substance in the work area
- Measures they can take to protect themselves from these hazards
- The details, location and availability, of their employer's written Hazcom program
- Location and availability of SDSs
- Special worker rights under the Hazcom Standard
- Labeling systems


Figure 11. SDS manual in tough-to-find location

Workers must also be trained on general hazard categories (corrosives, carcinogens, etc.) of hazardous chemicals used in the workplace. You are not required to receive training on every individual chemical you may work with, but you must receive training that covers the general hazardous categories, since these will all act on you in the same manner.

Is there an annual Hazcom training requirement?

☐ Yes ☒ No

Section 3: Review of Common Health Effects

There is a range of health effects caused by chemicals.

Simple chemical asphyxiants

If a chemical replaces so much air that there isn't enough oxygen to breathe it can cause **simple asphyxiation.**

There are many simple asphyxiants.

Which of these can be found on a construction job?

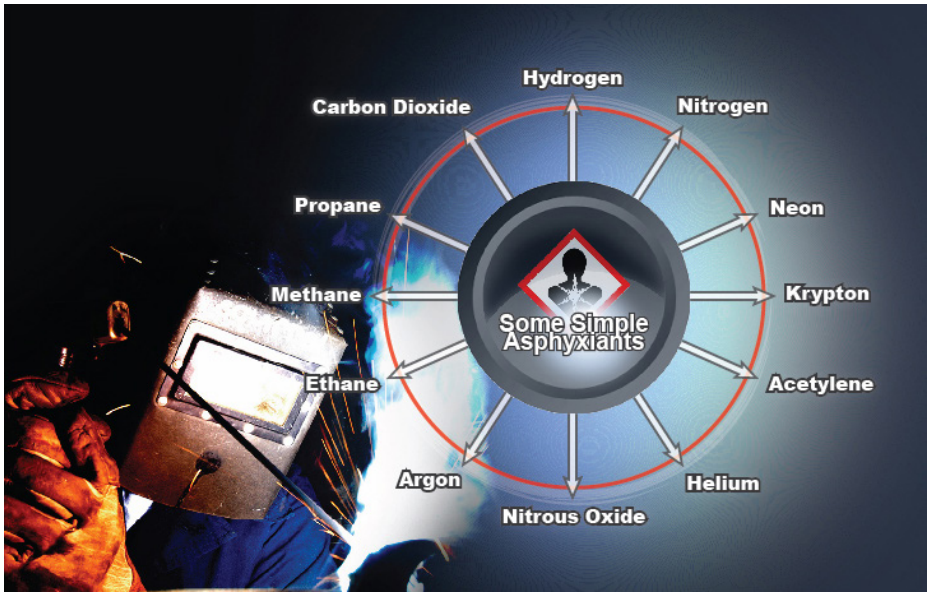


Figure 12

Figure 13. Confined Space.

Two workers died in this particular confined space in 2006. The case study by the Chemical Safety Board has a video of the incident that uses computer simulation to explain the deaths. This is the Valero Delaware City refinery asphyxiation death of two contractor employees who were preparing to reassemble a pipe on a pressure vessel while it was being purged with nitrogen. The first worker, in an attempt to retrieve a roll of duct tape from inside the vessel, was overcome by nitrogen, collapsed in the vessel and died. His co-worker, the crew foreman, was asphyxiated while attempting to rescue him.

Link to the case study:
http://www.csb.gov/assets/document/Valero_Case_Study.pdf

Link to the video:
http://www.csb.gov/investigations/detail.aspx?SID=25&Type=2&pg=1&F_All=y

Chemical asphyxiants reduce the blood's ability to carry oxygen which can lead to suffocation.

Some examples:

- Hydrogen sulfide
- Carbon monoxide
- Hydrogen cyanide

Sensitizers and allergens set up a reaction in the body so that even minor exposures can cause a reaction.

Sensitizers and allergens cause a reaction in an individual. The reaction depends upon the affected individual. Once someone is sensitized or allergic to a chemical, much lower exposures can cause a reaction, and the reaction can become more severe.

What are some examples of sensitizers or allergens?

List several substances that can cause an allergic reaction in the space below.

- Sprayed foam insulation with isocyanates
- oil-based paints
- wood dust
- poison oak and ivy (Rhus family plants)

Answers from previous question:

- Sprayed foam insulation containing isocyanates,
- oil-based paints,
- wood dust,
- poison oak and ivy (Rhus family plants)

Corrosives can severely damage the body.

Figure 14

Corrosives are widely used in chemical manufacturing as well as construction. Understand which products you are working with (such as etching concrete with hydrofluoric acid) before you begin work.

- Acids and bases are corrosive chemicals
- Corrosives can damage skin, eyes and the respiratory system
- The extent of skin damage depends on how long the corrosive is on the skin and the concentration of the corrosive.

Mutagens cause genetic changes and can lead to birth defects or other problems in following generations.

What are some examples of mutagens?

- Ionizing radiation
- Hydrogen peroxide
- Bromine

What are teratogens?


Figure 15

Teratogens are compounds that can harm the developing fetus, causing birth defects or death. The worst case of a teratogen exposure to a population is the Minamata Bay, Japan incident which was discovered in 1956. In this case, methyl mercury was used as a catalyst in a chemical process at Chisso Corps' chemical factory, which continued to dump the product from 1932 to 1968 into Minamata Bay.

Lead has been shown to a powerful teratogen, causing learning disabilities and other problems in children living in houses with lead-based paint. Dr. Herbert Needleman conducted an innovative study using the baby teeth of children to identify high lead levels and followed them for years showing higher rates of dropping out of school, behavioral problems and trouble with the law.

Here is a link to a Wikipedia account of his work:
http://en.wikipedia.org/wiki/Herbert_Needleman

Cancer-causing chemicals must be listed on an SDS even if the amount is only 0.1 percent of the product.

Carcinogens are cancer-causing compounds. Some chemicals are known or presumed human carcinogens, others are only suspected to be carcinogens. Manufacturers are required to list any carcinogens in their products, even if the amount is as low as 0.1% of the product. NIOSH states there is no known safe exposure level for carcinogens so employers and workers should try for NO exposure!

Here are a few known and suspect carcinogens:

- Asbestos
- Benzene
- Beryllium
- Cadmium
- Asphalt fume (suspect)
- Silica

Chemical effects on the body depends on many factors.

There are many factors that can play a role in how a chemical or a combination of chemicals harm workers. Therefore it is best to reduce all chemical exposures to as low as possible. Below is a short list of factors that affect a chemical's effect on the body:

- The physical form of the chemical
- How chemicals get into the body (route of entry)
- The dose
- Chemical toxicity
- Individual's reaction to the chemical (age, sex, race, weight, etc.)

The dose makes the poison.

"All substances are poisons; there is none which is not a poison. The right dose differentiates a poison from a remedy." Paracelsus (1493-1541)

A sixteenth-century Swiss chemist named Paracelsus gave us the most basic rule of toxicology: "The dose makes the poison." Practically every substance on earth (including water and Vitamin C) can kill you if they are concentrated enough in your stomach or your bloodstream.

Figure 16. Portrait of Paracelsus

The dose response curve shows how people respond to toxic chemicals

During studies of chemical effects, a dose-response curve is developed for a specific effect within a population. Most dose-response curves take on a characteristic "S" shape, as shown.

For instance, let's take a very common substance, caffeine. If a person consumes 10 grams at one time, that amount would be fatal. However, caffeine is a common substance which is found in our food and beverages.

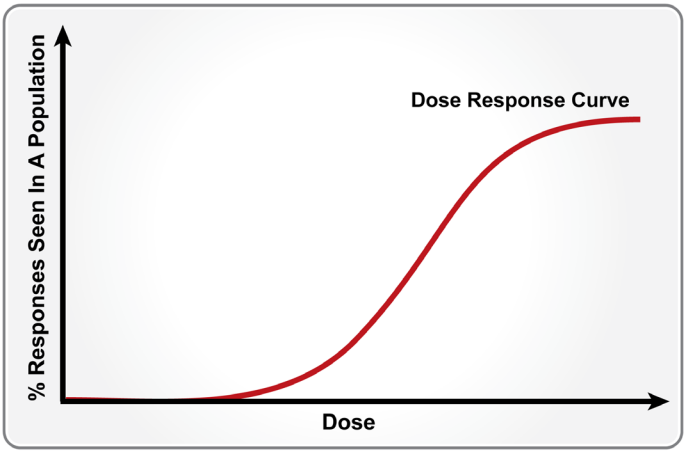


Figure 17. Dose Response Curve.

What might affect a person's impairment from alcohol along with the number of alcoholic drinks consumed? Might there be individual differences for effects from workplace chemicals, too?

How do chemicals enter your body?

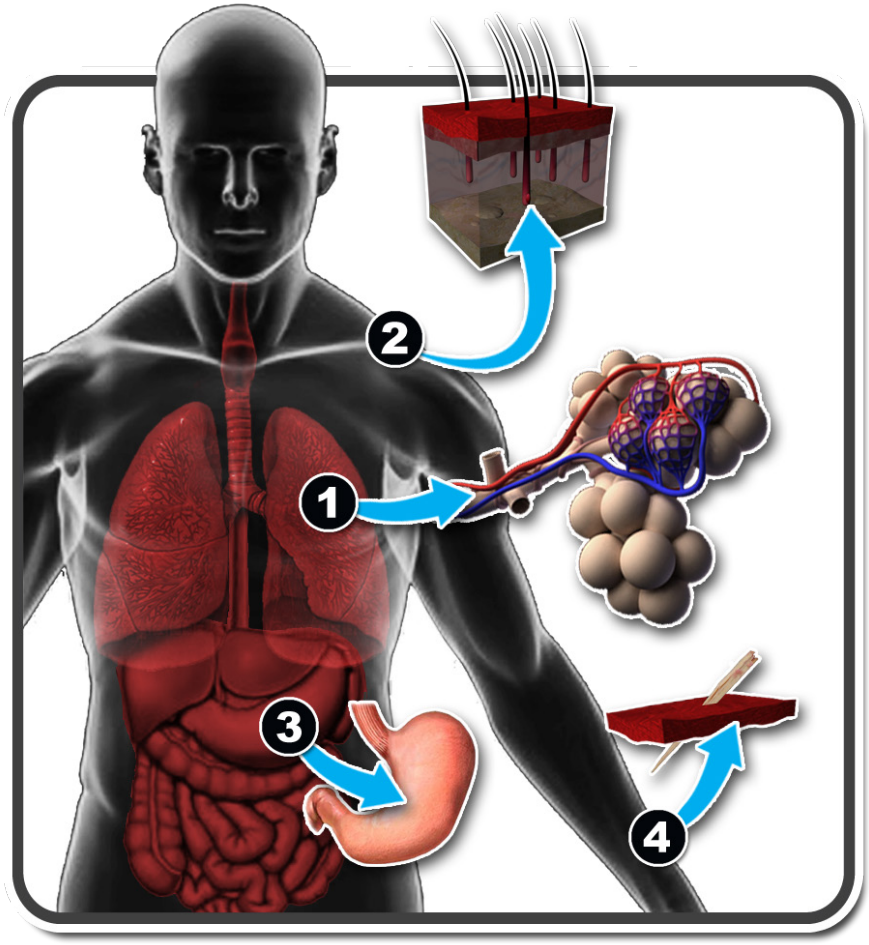


Figure 18. There are four major routes in which chemicals can enter your body.

Chemicals are only a hazard when you have been exposed to them. There are four major routes in which chemicals can enter your body. The **most common** type of exposure is through **breathing (inhalation)**. You inhale the chemical, which would then enter your lungs, where it would be absorbed into your bloodstream. We breathe approximately 20 to 25 thousand breaths in one day, which averages a total volume of 10,000–14,000 liters (13 -18 cubic yards) of air in a day.

The **second most common** type of workplace chemical exposure is **absorption** through the skin. For certain chemicals, once it is absorbed through the skin, it goes into the bloodstream.

The **third most common** type of chemical exposure is through **ingestion**, where the chemical enters the body through your mouth and is absorbed through the digestive tract. To minimize the ingestion route, good hygiene practices need to be observed–wash your face and hands prior to eating and drinking.

The **fourth most common** type of chemical exposure is through **injection** in which the chemical enters the body through a sharp object like a needle, nail or rebar.

1. Inhalation is the main route of entry

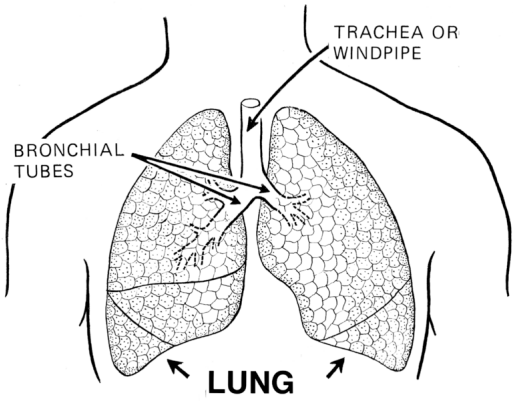


Figure 19

The lungs are a critical route of entry for exposure to workplace chemical hazards. If one could take the average set of human lungs and spread them out, they would cover an area the size of a tennis court (140 m2). This means that there is an enormous surface area within the lungs where chemicals can interact with tissue.

The lungs are also important to consider because of the large volume of air (and pollutants in the air) that passes through them continually, as well as the thin membranes in the gas exchange region (alveoli).

- Gases and vapors can reach the deep lungs
- Particle and droplet size affects where the chemical settles in the respiratory tract
- Where the chemical settles in the respiratory tract influences symptoms and diseases

2. Absorption is the next most common route

The skin has a protective coating of oils which acts as a natural barrier. Fat soluble can pass through the skin and are absorbed into the blood stream. Significant amounts of chemicals are most likely to be absorbed when a large area of skin is in direct contact with a liquid, mist or dust for long periods of time. For some highly toxic substances, dangerous levels may be absorbed from skin contact with gases or vapors. Hydrogen cyanide is an example of a gas that can be absorbed. Once in the blood, chemicals are carried throughout the body and can harm other organs. Still other chemicals, such as corrosives, may affect the skin on direct contact. Damaged or very wet skin will allow substances to pass more readily into the blood. A concentrated chemical will pass more easily through the skin's barrier.

Chemicals also can be absorbed through mucous membranes in the eyes or nose.

- If chemicals get onto the outside of your body they may be able to pass through
- Some areas are more at risk than others such as the eye, reproductive areas, and forehead.
- Open wounds can increase absorption
- Chemical properties affect absorption

Are all areas of the skin equally protective?

☐ Yes ☒ No

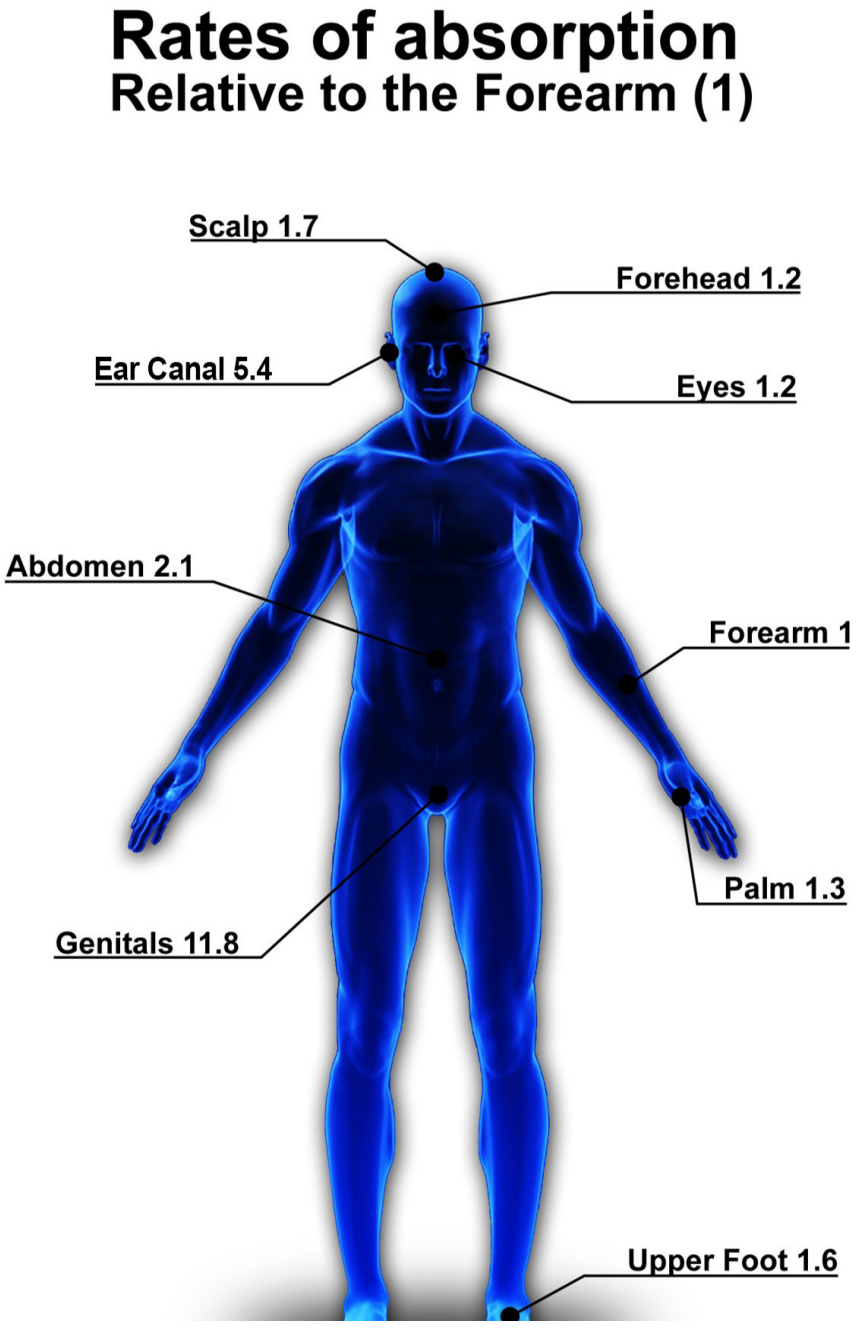

Rates of absorption
Relative to the Forearm (1)
Scalp 1.7
Forehead 1.2
Ear Canal 5.4
Eyes 1.2
Abdomen 2.1
Forearm 1
Palm 1.3
Genitals 11.8
Upper Foot 1.6

Figure 20

3. Ingestion

Chemicals that are swallowed are absorbed in the digestive tract

Many substances can enter the body through the mouth and digestive tract. This is a less common route of entry than the respiratory system or the skin. A person's hands may be covered with a toxic dust, say lead, and she could then eat, smoke, or apply cosmetics and inadvertently "eat" the dust.

Figure 21. Workers take a lunch break at Ground Zero.

4. Injection

Construction workers have plenty of opportunities for accidental injection of chemicals

List several ways workers might absorb, inhale, ingest or inject chemicals. Write your answers below.

Figure 22. Nail protruding from wood.

Absorb: Spill solvents onto bare skin or open cuts; work without gloves and get chemicals on hand
Inhale: Work with dusty processes or solvents that have a high vapor pressure
Ingest: Transfer contamination from unwashed hands onto food or drink; leaving open containers of food where dust can settle
Inject: Force contamination into the skin through high pressure washing; step on contaminated nails; cut skin on protruding metal

Chemical exposures are either acute or chronic. What is the difference?

Acute exposure is a short term or immediate high dose. Acute exposures can lead to disease or injury that develops immediately or within days. Generally, the effects wear off soon after the exposure ends. Sometimes, however, a permanent illness, such as asthma from chemicals, or cell death from ionizing radiation, can be caused by such an exposure. Eye and throat irritation from Portland cement dust is an example of an acute effect.

- High exposure over a short time (instantaneous to a few days)
- After exposure stops, damage may reverse…or not

Chronic exposure is a repeated, low-to-mid dose of chemical which may lead to disease that develops slowly, over a period of months or years or manifests itself years after exposure. Asbestosis and cancer are examples of chronic illnesses.

- Low exposure over a long time period (years)
- Can cause disease or other irreversible effects

What chronic conditions can result from cement finishing?

What is a latency period? What is a classic example?

Write the answer here:

A latency period is the time between an exposure and the emergence of a health problem, usually a period of years. The classic example is asbestos-related diseases like asbestosis and mesothelioma, which can take up to 25 years from initial exposure to appear.

What is the difference between local and systemic harm?

Some chemicals harm the body at the site of their exposure, such as an acid burn. Other chemicals can affect entire body systems, such as lead and alcohol. Some can do both, such as alcohol and organic solvents you use at work.

Multiple chemicals may have unique effects when combined in your body.

Figure 23. World Trade Center cleanup.

Examples:

- Alcohol and solvents
- Asbestos and cigarette smoke
- Exposures at the WTC cleanup

Section 4: Overview of Chemical Hazards

As mentioned in the last section, training workers about the different hazard categories is mandatory.

All chemicals are found in one of three forms.

Chemicals, or hazardous materials, come in all forms, shapes and sizes. Recognizing the potential forms of a chemical gives you clues as to how it may pose a danger to you and your coworkers. Chemicals are found in three states: solid, liquid and gas. You can even have a chemical in different states depending on environmental conditions such as pressure and temperature. For example, under normal conditions, water is a liquid between 32° F and 212° F. Below 32° F it is a solid (ice) and above 212° F it is a gas (steam). You can find most of this information on an SDS or product label, but not always.

Each chemical form can have different "types" or categories. Write an example for each from one of your recent jobs.

1. Solid Example: _____
2. Liquid Example: _____
3. Gas Example: _____

Besides determining if a chemical is in a solid, liquid or gaseous state, we can also look at the common forms chemical products come in as the following list shows:

Solids
- Dusts
- Fibers
- Fumes

Liquids
- Aerosols
- Mist
- Gels
- Adhesives

Gases
- Acetylene
- Oxygen
- Carbon monoxide
- Nitrogen

Solids

There are many solids that you may be exposed to if you are in construction work. Take a moment to think of all the construction materials you use on the job where "dust" can get into the air and reach your breathing zone and enter your body.


Figure 24. Dust from sanding

Mixing cement/concrete/mortar/grout, cutting, sanding or grinding any material, even sweeping the floor could create a great deal of dust.

By understanding that solid materials that you work with may reach your breathing zone, you are aware of the hazard and can take steps to protect yourself.

Liquids

Liquids can come into direct contact with your skin or eyes and harm that area or be absorbed into your body. Liquids can be sprayed and form mists or evaporate and form vapors which can be inhaled. Mists can settle on your skin and be absorbed or settle and contaminate food or drinks. Any time you use a liquid or gel, your skin and eyes are at risk of exposure. Paints, adhesives and fuels can form vapors and reach your breathing zone.

Gases and Vapors

Gases are chemicals that are in the gas phase at room temperature (70° F). Vapors evaporate from substances that are liquids or solids at room temperature. **Gases and vapors that a worker breathes can reach the lungs and cause harm.**


Figure 25. Vapors and dust from asphalt

It is important to understand these physical properties of chemicals.

By understanding some physical properties of chemicals you will better understand how a chemical may act in the environment and therefore you will be able to protect yourself. Take vapor density for example. Maybe you are cleaning a mechanical component in a confined space with an organic solvent possessing a high vapor density. You can assume that it would start to settle toward the floor as it evaporates. How would this fact help protect you? You could assume that without good ventilation, organic vapors will become trapped in the space and build up to levels that may be harmful to you!

Important physical properties to consider include:

- **PH (corrosive power)**
  The pH scale is a simple way to define acids and bases. This scale assigns a number from 0 to 14 to a solution. Any solution with a pH less than 7 is an acid. Any substance with a pH greater than 7 is a base. A solution with a pH of 7 is neutral. **With corrosives, concentration is critical:**

  Acetic Acid:
  90% solution destroys skin (pH<2),
  6% is vinegar we put it on salads (pH~4.5)

- **Vapor pressure (VP) (chemical's volatility)**
  The vapor pressure is a measure of how much vapor is given off by a chemical at a given temperature. The higher the vapor pressure the more likely it is that you will have significant quantities of a chemical in the air above the liquid. Vapor pressure is measured by seeing how "hard" the vapor of a material "pushes" against the sides of a closed container. The more heat that is applied to a liquid, the greater its vapor pressure will become. Vapor pressure is measured in millimeters of mercury (mmHg). Vapor pressure is usually reported for the chemical at room temperature. At higher temperatures the vapor pressure will increase rapidly. If a chemical has a high vapor pressure, more of it will be in the air compared to a chemical with a low vapor pressure.

  Low Vapor Pressure — less than 1 mmHg @ 68° F
  Moderate vapor Pressure — between 1 and 10 mmHg @ 68° F
  High Vapor Pressure — higher than 10 mmHg @ 68° F

  What does the vapor pressure of sulfuric acid tell us about hazards from spills?

  Sulfuric acid VP = 0.001 mm Hg

- **Flash Point (Fl.P.)**
  The minimum temperature of a liquid at which sufficient vapor is given off to form an ignitable mixture with air near the surface of the liquid. In other words, the temperature where enough fuel will vaporize to have an explosion or fire.

  What is the unit for flash point?

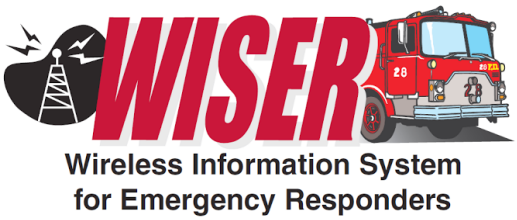
  Degrees Fahrenheit

Flash Point Class Exercise (optional)

Using whatever resources are available, look up and record the flash point for the chemicals below and put in order of most to least flammable.

If internet access is available, you can use:

- The NIOSH Pocket Guide: http://www.cdc.gov/niosh/npg/
- WISER, the Wireless Information System for Emergency Responders: http://wiser.nlm.nih.gov/
- WISER is available as a free app, as well, so check it out on your smart phone.



Chemical	Flash Point	Order of Flammability
Diesel fuel	Diesel fuel = 136 degrees F	4 (least flammable)
Gasoline	Gasoline = - 45 degrees F	1 (most flammable)
Benzene	Benzene = 12 degrees F	2
Turpentine	Turpentine = 95 degrees F	3

- **Ingredients for a fire (Fire Tetrahedron)**
  Flammability is the ability of a solid, liquid or gas to ignite and produce a flame. Four elements are required in specific ratios for combustion to occur: fuel, oxygen, heat, and a chain reaction. This relationship is described by the fire tetrahedron. The fire can be extinguished by taking away any one element of the fire tetrahedron.

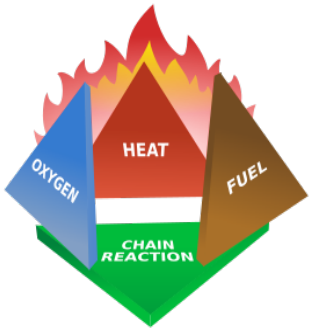
  

  Figure 26. **Fire Tetrahedron.**

  This used to be a fire triangle, but chain reaction was added because the reaction must continue if a fire is to be sustained. Think about lighting a cigarette lighter beneath a 2 by 4 for a second . There is heat, oxygen and fuel, but no chain reaction. If the 2 by 4 was ground into sawdust, the reaction would go forward because the ratios were right.

- **Explosive limits**
  The range or limit that the vapors will be mixed sufficiently in air to ignite. Each chemical (that can burn) will have a lower and upper explosive limit (LEL and UEL respectively). If a fuel is within its flammable range and there is sufficient oxygen and an ignition source, you will have an explosion or fire.

Optional Exercise: Look up and record the lower and upper explosive limit for these chemicals.

Chemical	Lower explosive limit %	Upper explosive limit %
Kerosene	0.75	5
Gasoline	1.4	7.6
Methylene chloride (furniture stripper)	13	23

- **Vapor Density (VD) and Relative Gas Density (RgasD)**
  Vapor density tells you if the vapor of a liquid goes up or down in air. Vapor density is measured in comparison with air (air =1). If a chemical has a vapor density greater than one, it means that the vapor will tend to sink to the ground and roll along just like a liquid, collecting in invisible puddles and pools in low lying areas. The material may be nontoxic, but it still may be able to collect in low areas or confined spaces at high enough levels to cause an explosive atmosphere, or to replace oxygen in the air.

What is the rule about vapor density for most chemicals encountered in construction work?

[X] Heavier than air [ ] Lighter than air

These are not all the physical properties of chemicals but they are the ones that most affect workers' health and safety. Many of these can be identified on a chemical's SDS or in the National Institute for Occucpational Safety and Health (NIOSH) Pocket Guide.

Section 5: Measurement and Exposure Limits

We will now briefly review measurement of chemicals, units of measure and exposure limits.

Why do we monitor?

Air monitoring is required to be reviewed under Hazcom training. If you are at a job site and are receiving Hazcom training, you should be made aware, in some type of training, that the work site has the capability to monitor for the chemical exposures you may face. If you have any questions concerning air monitoring, please see a supervisor, union steward or site health and safety professional.

There are two types of monitoring: real-time and samples that are sent to a lab.

Real-time equipment can give immediate chemical exposure measurements.

- Combustible gases
- Toxic vapors and gases
- Oxygen

Figure 27

But OSHA requires sampling from a worker's breathing zone!

Personal monitoring determines a specific employee's exposure.

Recognizing these units will help you understand exposure results.

Common units of measure include:

- Parts per million (ppm)
- Parts per billion (ppb)
- Milligrams per cubic meter (mg/m^3)
- Percent (%)
- Fibers per cubic centimeter (fibers/cc)

Parts per million (ppm) is a very small amount; an example is 4 drops of ink in a 55 gallon drum. Parts per billion (ppb) is one thousand times less than ppm.

Gram is a measure of weight.

- 1 paperclip = 1 gram
- Milligram (mg) = one-thousandth of a gram (1,000th)
- Microgram (µg) = one millionth of a gram (1,000,000th)


Figure 28

Cubic centimeter is a measure of volume.

A thimble holds around 3 cubic centimeters of air.


Figure 29

OSHA has Permissible Exposure Limits (PELs), but it is critical to remember…

- Most are from 1968 American Conference of Governmental Industrial Hygienist's (ACGIH) Threshold Limit Values (TLVs)
- Current TLVs are often lower
- NIOSH Recommended Exposure Limits (RELs) are usually lower
- Most chemicals have no exposure limits set

What are the main exposure limits?

Exposure limits are a way to compare a worker's exposure on the job with an assumed "safe" limit, which was derived from scientific study. It can be argued that many exposure limits are too low and most chemicals do not have an exposure limit. However, they are all we have to assist us in protecting workers. Some exposure limits are guidelines (usually more protective) and some are the Law (though usually not as protective as guidelines). Below are the three main exposure limits used to protect workers.

- OSHA Permissible Exposure Limits (PELs). PELs are the Law!
- ACGIH Threshold Limit Values (TLVs)
- NIOSH Recommended Exposure Limits (RELs)

Most exposure limits are based on an average over eight hours.

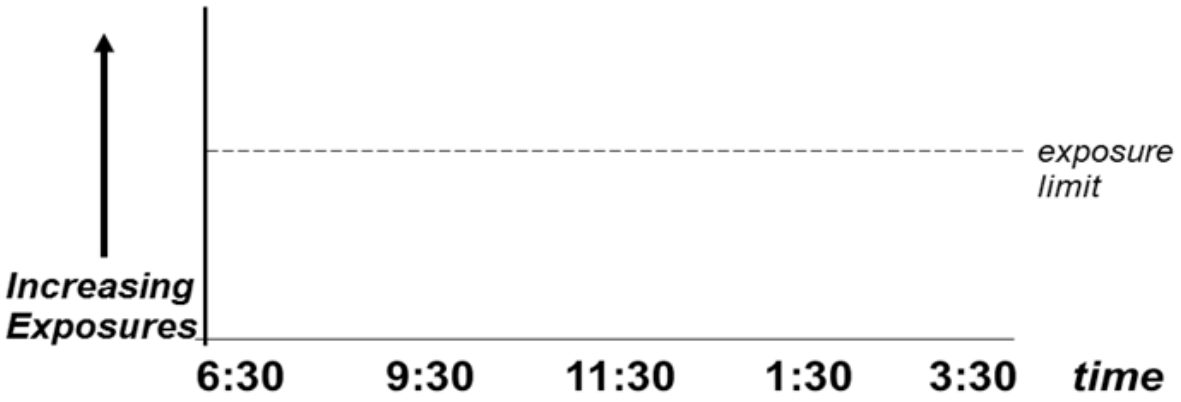


Figure 30

Exposure limits are based on 8-hour or 10-hour averages, ceilings (cannot exceed), or 15-minute peak exposures. Exposures must be kept below OSHA PELs. Most exposure limits are for airborne exposures. **Some chemicals have ceilings that can't be exceeded.** Exposure limits do not take into account exposure from multiple chemicals.

Section 6: Other Ways to Communicate Hazards

Types of labeling systems

There are different types of labeling systems that should be in place to help you recognize when hazardous chemicals are present in the work area. These labeling systems are:

- HMIS
- NFPA 704 M
- DOT placards
- Product labels

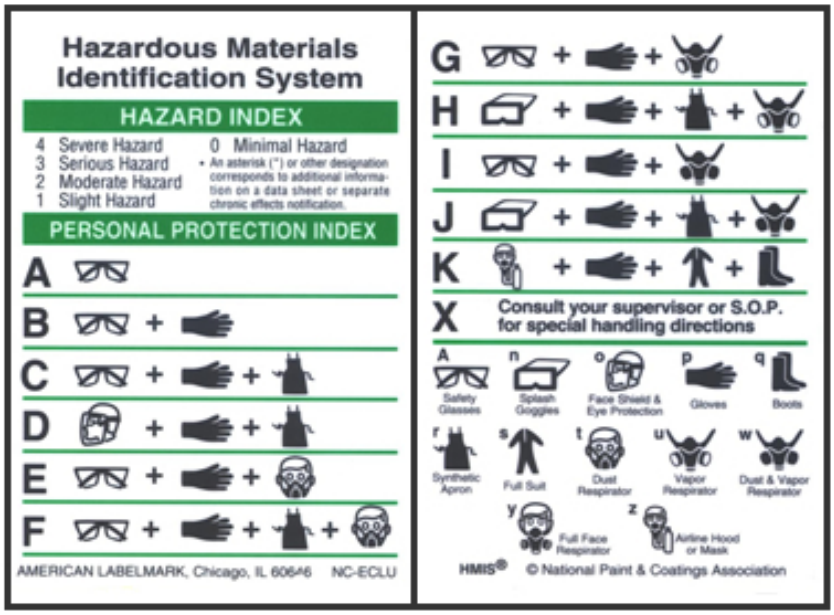


Figure 31

Figure 32

Hazardous Materials Identification System (HMIS)

Color-coded HMIS ranks hazards and recommends PPE.

The Hazardous Materials Identification System (HMIS) uses rectangular labels which may be found on bulk storage units or smaller containers at a site. The HMIS system addresses four topics. For health, flammability and reactivity, a number from 0 to 4 is assigned based on the severity of the hazards, just like NFPA. The higher the number, the more severe the hazard. The fourth designation is for Personal Protective Equipment. These PPE recommendations apply to normal use and may not be adequate for an emergency. Although chronic health effects usually are not rated, they may be indicated after the health hazard rating or by written warnings in the upper white section of the label.

HMIS labels also contain the name of the product and more specific hazard information including:

- Routes of entry
- Health hazards
- Target organs and effects
- Physical hazards.

NFPA 704 M diamond is widely used.

Originally developed to quickly warn fire fighters about potential chemical hazards in a fire, the National Fire Protection Association (NFPA) labeling system provides important information to the construction worker. However, use of the NFPA labels is not required by OSHA. The NFPA label is a diamond containing four smaller diamonds of different colors. The colors of the smaller diamonds are red (flammability), blue (health hazard), yellow (reactivity hazard), and white (specific hazards). The red, blue, and yellow squares contain a hazard rating from 0 to 4, which indicates the severity of the hazard, with 4 being the most dangerous. The white square is reserved for symbols that represent specific hazards, such as to not mix with water or radiation.

Figure 33. NFPA 704 M Diamond

For this example chemical,

1. What is the greatest hazard, health, fire or reactivity?

Reactivity is the greatest risk with a score of 3, “Shock and heat may detonate.”

2. What is the specific hazard?

The specific hazard is that it is radioactive. This is a really hazardous chemical!

Department of Transportation requires placards on vehicles carrying hazardous chemicals.

The Department of Transportation (DOT) requires trucks and trailers, railroad cars, and many marine vessels to display placards indicating the hazards presented by material in shipment. Labels, which are smaller, are usually found on packages, carboys, and other smaller containers being transported or stored. These placards and labels are in addition to what OSHA requires.

HAZMAT placards

Placards are diamond-shaped, 10 ¾-inches square, point-on-point fixtures. They should be located on all four sides of a vehicle carrying a quantity of hazardous materials that requires placarding.

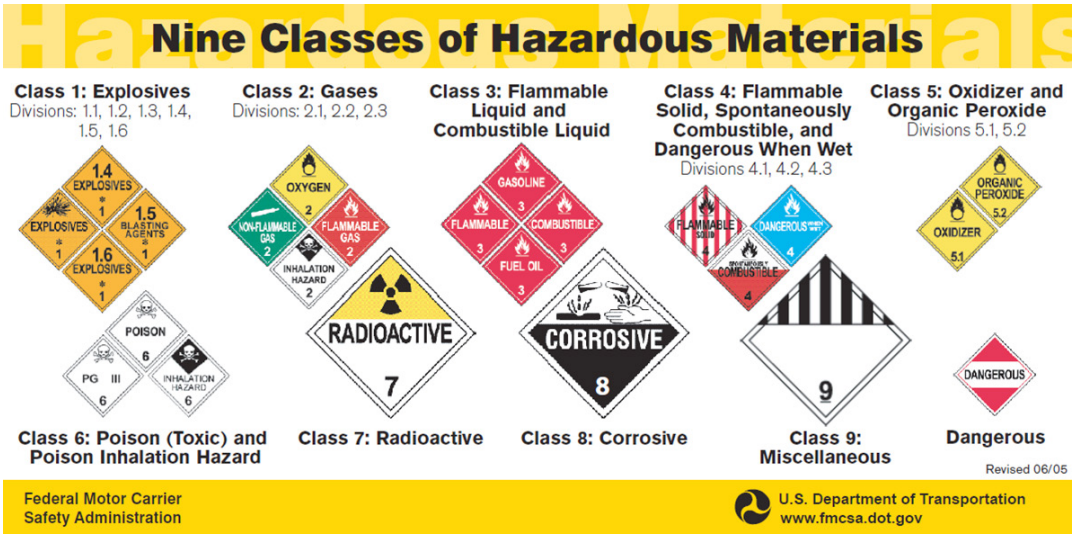


Figure 34

Placards provide recognition information in a number of ways:

- Background color
- Symbol at the top
- Hazard class wording or identification number in the center
- United Nations (UN) hazard class number at the bottom

For transportation, pictograms will have the background and symbol colors currently used.

Section 7: Controlling Hazards

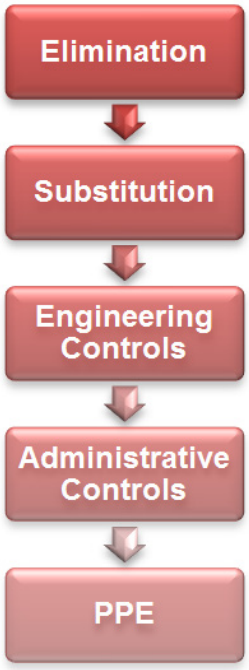


Figure 35

The hierarchy of controls can protect you from hazardous chemicals.

The hierarchy of controls is a list of methods, in order from most desirable to least desirable, which emphasizes controlling a hazard at its source. This is done by giving preference to eliminating the hazard altogether; then to the use of the engineering controls. These types of strategies should be used first, where possible, because they are less subject to human error and because they are less disruptive and uncomfortable for people to use and for people working in the area. Whichever methods you use, remember that in each case their effectiveness should be monitored regularly.

The overall idea is to design or redesign the workplace to fit the needs of workers. Training workers and providing Personal Protective Equipment is necessary but, creating as safe and healthy a workplace as possible is the ultimate goal. Achieving the goal requires methods such as substituting less dangerous chemicals or processes in place of harmful ones, designing workstations to cause less harm to workers, and by integrating health and safety of the workplace into the design stages of workplaces and work process development.

Eliminate or substitute chemicals you currently use with less harmful ones.

Are there any chemicals you could eliminate or substitute at your job? Is it possible to make that substitution? Green chemistry and green jobs may be a good avenue for substitution or elimination. However, **just because it is "green", does not always mean it is safe!**

Figure 36. JobCorp student using a soy-based spray foam.

Figure 37

- **Hardiplank: 10-50% silica**
- **Weatherboard: 45-55% silica**

Fiber-cement board is a concrete-like material used in roof shingles, panel units, floor underlayment, and siding. It is strong, durable, mold and weather resistant, and non-combustible. It is however potentially dangerous to workers due to its crystalline silica composition. Workers who cut it or work with it in such a way as to produce dust are at risk of silica exposure. Other workers in proximity to this work may also be affected by the silica hazard.

WISHA is the Washington Industrial Safety and Health Act enforcement group. *WISHA inspection data* showed 5 of 7 workers using circular saws outdoors on fiber-cement siding were exposed above ACGIH-TLV for silica

Use engineering controls to reduce chemical exposures.

There are wet method engineering controls to reduce dust exposures on construction jobs.

Figure 38

Ventilation controls are effective for construction dust exposures.

Figure 39. Tuck-pointing without controls

Figure 40. Tuck-pointing with controls

CPWR's Construction Solutions can help you select effective controls for your trade.

http://www.cpwrconstructionsolutions.org

Figure 41. CPWR Construction Solutions

eLCOSH is a great source of training materials and information for workers.

http://www.elcosh.org

Figure 42. eLCOSH website.

Administrative controls can also reduce chemical exposures.

Administrative controls are any procedure that significantly limits daily exposure by control or manipulation of the work schedule or manner in which work is performed. Administrative controls are not as effective as engineering controls but many are quick and inexpensive to implement.

- Training and information
- Signage
- Maintain equipment to prevent leaks and releases
- Standard Operating Procedures (SOPs)
- Worker rotation
- Scheduling tasks when chemical use is low

Figure 43. Signage is an administrative control.

Personal Protective Equipment is at the bottom of the hierarchy of controls. Why?

Here are some possible answers:

- The toxin is always there
- If the PPE fails, you have no protection
- The employer must do an assessment to make sure the PPE is correct
- PPE is uncomfortable

PPE is a required component of training for the Hazcom standard; 29 CFR 1910.1200(h)(3)(iii).

NIOSH-approved respirators can protect your lungs from chemical exposure.

Figure 44

After exhausting the controls process, you may be left with using PPE as your only protection. On most SDSs, a list of recommended PPE will be given, but it may only state something close to the following: “For handling of chemical, use appropriate gloves and respirator.” Now what does “appropriate” mean? They may not spell out or list which type of PPE you will need. You may have to find that information in some of the other recourses we mentioned or hopefully, your industrial hygienist, or other competent person, has already chosen the correct PPE for you to use.

Employers must have a respiratory protection program that includes medical clearance, fit testing and proper selection.

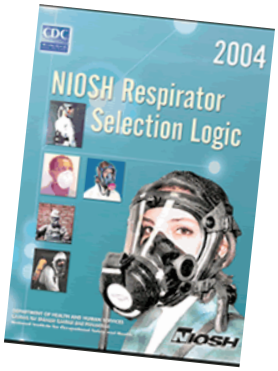


Figure 45

Whenever you use PPE, be sure to

- Use PPE that has been selected for a given hazard and fits correctly
- Don PPE only if you've been trained
- Always inspect PPE before use
- NEVER use damaged PPE
- Only use PPE as a last resort to control hazards!

Are there any health and safety issues from wearing PPE?
Yes! The following are often a problem:

- Heat stress
- Limited movement
- Limited vision
- Limited hearing
- Claustrophobia

Section 8: Emergencies and First Aid

Learn about first aid arrangements on your jobsite and read labels and SDSs before using chemicals.

What happens if you encounter a leak?

The differences between an emergency and an "incidental spill" are level of hazard, risk, familiarity and training. REMEMBER, you are not trained for emergency response. Inform your supervisor of unusual odors, spills, or releases, etc. Inform coworkers and leave an area of a large spill or chemical release. Follow your employer's spill response program for further information.

You must be trained to respond to a fire of any size. Learn about the policy on fighting fires at your site.

Figure 45. Photo courtesy Whiting Turner Construction Company and GW University.

What if you have been exposed to a chemical?

1. Let your supervisor and union know.
2. Find out which chemical(s) were involved.
3. Follow the first aid directions in the SDS.
4. Get medical attention as needed.
5. Call health and safety to evaluate situation and cause of exposure before returning to work

Now that you have had this class, what actions will you take at your jobsite to find out more about the chemicals you work with?

You should promote discussion and hopefully get some answers like:

1. Look for the book of SDSs on our site and look up products I work with
2. Look at the labels on the products I use
3. See what plans we have for cleaning up spills
4. Find out where we are all supposed to assemble if there is an emergency on our site.

Resources

European Chemicals Agency, (2001). http://echa.europa.eu/

OSHA, (2011). 29 CFR 1910.1200. Hazard Communication Standard. http://www.osha.gov/dsg/hazcom/standards.html

OSHA, (2008). Chemical Hazard Communication. Document 3084.

DiNardi, Salvatore, Silk, Jennifer. (1997). The Occupational Environment-Its Evaluation and Control. AIHA Press; Chapter 40.

United Nations, (2003). Globally Harmonized System of Classification and Labeling of Chemicals (GHS) “The Purple Book”.

Appendix A: Glossary

ACGIH: American Conference of Governmental Industrial Hygienists. ACGIH develops and publishes recommended occupational exposure limits for chemical substances and physical agents.

Acid: Any chemical that undergoes dissociation in water with the formation of hydrogen ions. Acids have a sour taste and may cause severe burns. They turn litmus paper red and have pH values of 0 to 6.

Acute effect: Adverse effect on a human or animal body that takes place soon after exposure.

Acute toxicity: Adverse effects resulting from a single dose of or exposure to a substance.

Air-line respirator: A respirator that is connected to a compressed breathable air source by a small-diameter hose. The air is delivered continuously or intermittently in a sufficient volume to meet the wearer's breathing requirements.

APR: Air-Purifying Respirator. A respirator that uses chemicals to remove specific gases and vapors from the air or that uses a mechanical filter to remove particulate matter. An air-purifying respirator must be used only when there is sufficient oxygen to sustain life and the air contaminant level is below the concentration limits of the device.

Alkali: Any chemical substance that forms soluble soaps with fatty acids. Alkalis are also known as bases and may cause severe burns. Alkalis turn litmus paper blue and have pH values from 8 to 14.

Asbestosis: Chronic lung disease caused by inhaling airborne asbestos fibers.

Asphyxiant: Vapor or gas that causes unconsciousness or death by suffocation. Most simple asphyxiants are harmful to the body only when they become so concentrated that they reduce oxygen in air (normally 20.9 %) to dangerous levels (16 percent or lower). Some chemicals, such as carbon dioxide, function as chemical asphyxiants by reducing the blood's ability to carry oxygen.

Base: Substances that usually liberate OH anions when dissolved in water. Bases react with acids to form salts and water. Bases have a pH greater than 7, turn litmus paper blue, and may be corrosive to human tissue. A strong base is called alkaline or caustic.

Carbon dioxide (CO_2): Heavy, colorless gas produced by combustion and decomposition of organic substances and as a by-product of chemical processes. Will not burn, relatively nontoxic, and unreactive. Can cause oxygen-deficient environments in large concentrations. Is useful as fire-extinguishing agent to block oxygen and smother fire.

Carbon monoxide (CO): Colorless, odorless, flammable, and very toxic gas produced by the incomplete combustion of carbon compounds and as a byproduct of many chemical processes. A chemical asphyxiant, it reduces the blood's ability to carry oxygen.

Carcinogen: Substance or agent capable of causing or producing cancer in mammals.

CAS: An assigned number that identifies a chemical. CAS stands for Chemical Abstracts Service, an organization that indexes information published in Chemical Abstracts by the American Chemical Society and that provides index guides by which information about particular substances may be located in the abstracts. The CAS number is a concise, unique means of material identification.

Ceiling (C): Maximum allowable human exposure limit for airborne substances; not to be exceeded even momentarily.

CFR: Code of Federal Regulations. A collection of the regulations established by law.

Chemical: Any element, chemical compound, or mixture of elements and/or compounds.

Chemical manufacturer: An employer in a workplace in which chemicals are produced for use or distribution.

Chemical name: Scientific name that clearly identifies the chemical for hazard evaluation purposes.

Chemical reactivity: Ability of a material to chemically change. Undesirable and dangerous effects, such as heat, explosions, or the production of noxious substances, can result.

Chronic effect: Adverse effect on a human or animal body with symptoms that develop slowly over a long period of time or that recur frequently.

Chronic exposure: Long-term contact with a substance.

Combustible liquids: Term used by NFPA and DOT to classify certain liquids that will burn, on the basis of flash points. NFPA and DOT generally define “combustible liquids” as having a flash point of 100° F or higher. They do not ignite as easily as flammable liquids; however, they can be ignited under certain conditions, and must be handled with caution.

Container: Any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical. Under hazard communication rules (1910.1200), pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle are not considered to be containers.

Corrosive: Liquid or solid that causes visible destruction or irreversible alterations in skin tissue at site of contact, or liquid that has severe corrosion rate on steel.

DOT: U.S. Department of Transportation

Dust: Solid particles suspended in air produced by some mechanical process, such as crushing, grinding, abrading, or blasting. Most dusts are inhalation, fire, or dust explosion hazards.

Employee (worker): A worker who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies.

Employer: A person engaged in a business in which chemicals are either used, distributed, or produced for use or distribution, including a
contractor or subcontractor.

Engineering controls: Systems that reduce potential hazards by isolating the worker from the hazard or by removing the hazard from the work environment. Methods include ventilation, isolation, and enclosure.

EPA: Environmental Protection Agency

Explosive: Material that produces a sudden, almost instantaneous release of pressure, gas, and heat when subjected to abrupt shock, pressure, or high temperature.

Exposure: An employee who is subjected during the course of employment to a chemical that is a physical or health hazard; includes accidental or possible exposure. “Subjected” includes any route of entry: inhalation, ingestion, skin contact, or absorption.

Exposure limits: Concentration in air of a chemical that is thought to be acceptable.

Flammable limits: Minimum and maximum concentrations of flammable gas or vapor between which ignition occurs.
Flash Point (Fl.P.): Temperature at which a liquid will give off enough flammable vapor to ignite. There are several methods for testing flash points; flash points for the same material may vary depending on the test method.

Fume: Airborne suspension consisting of minute solid particles arising from the heating of a solid.

Gas: Formless fluid that occupies the space of its enclosure. Can settle to the bottom or top of an enclosure when mixed with other materials. Can be changed to its liquid or solid state only by increased pressure and decreased temperature.

Hazardous chemical: Any chemical whose presence or use is a physical hazard or a health hazard.

Hazardous material: Any substance or mixture of substances having properties capable of producing adverse effects on the health or safety of a human being.

Hazardous Materials Identification System (HMIS): Developed by the NPCA to provide information about health, flammability, and reactivity hazards encountered in the workplace. A number is assigned to a material indicating the degree of hazard, from 0 for the least up to 4 for the most severe. Letters are used to designate personal protective equipment.

Health hazard: A chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees.

Ingestion: Taking in a substance through the mouth.

Inhalation: Breathing in a substance as a gas, vapor, fume, mist, or dust.

Irritant: Substance that will cause an inflammatory response or reaction of the eye, skin, or respiratory system.

Label: Any written, printed, or graphic sign or symbol displayed on containers of hazardous chemicals; includes identity of the material, appropriate hazard warnings, and name and address of the chemical manufacturer, importer, or other responsible party.

Latency period: Time that elapses between exposure and the first manifestations of disease or illness.

Local effects: Toxic or irritation effects that occur at the site of contact with a chemical or substance.
Local ventilation: Drawing off and replacement of contaminated air directly from its source.

Lower Explosive Limit (LEL): Lowest concentration (percentage of the substance in air) that will produce a flash of fire when heat, electric arc, or flame is present.

Material Safety Data Sheet (MSDS): Written or printed material concerning a hazardous chemical prepared in accordance with 1910.1200(g).

Mist: Suspended liquid droplets in the air generated by condensation from the gaseous to the liquid state or by mechanically breaking up the liquid by splashing or atomizing.

mm Hg: A measure of pressure in millimeters of a mercury column above a reservoir, or difference of level in a U-tube.

NFPA: National Fire Protection Association

NIOSH: National Institute for Occupational Safety and Health

Oxidizer: Substance that yields oxygen readily to stimulate the combustion of organic matter.

parts per million (ppm): Unit for measuring concentration of a gas or vapor in air. Parts of the gas or vapor in a million parts of air. Also used to indicate the concentration of a particular substance in a liquid or solid.

(PEL): The PEL indicates the permissible concentration of air contaminants to which nearly all workers may be repeatedly exposed 8 hours a day, 40 hours a week, over a working lifetime (40 years), without adverse effects.

Personal Protective Equipment (PPE): Devices or clothing worn to help isolate a worker from direct exposure to hazardous materials.

pH: Scale of 0 to 14 representing acidity or alkalinity of aqueous solution. Pure water has pH of 7.

Physical hazard: A chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water reactive.

Recommended exposure limit (REL): A exposure limit from NIOSH. The highest allowable airborne concentration that is not expected to injure a worker. Expressed as a ceiling limit or as a time-weighted average, usually for a 10-hour work shift.

Reproductive hazard: Any agent that has a harmful effect on the adult male or female reproductive system or the developing fetus or child.

Respiratory system: Breathing system, including the lungs and air passages, as well as the associated system of nerves and circulatory supply.

Respiratory protection: Devices that will protect the wearer's respiratory system from overexposure by inhalation of airborne contaminants. Respiratory protection is used when a worker must work in an area where he/she might be exposed to concentration in excess of the allowable exposure limit.

Routes of entry: Means by which material may gain access to the body (inhalation, absorbtion, ingestion, or penetration).

SCBA: Self-contained breathing apparatus

Sensitization: State of immune-response reaction in which further exposure elicits an immune or allergic response. A person previously exposed to a certain material is more sensitive when he experiences further contact with it.

Sensitizer: Substance that, on first exposure, causes little or no reaction in humans or test animals but that, on repeated exposure, may cause a marked response not necessarily limited to the contact site.

Solvent: Substance, usually liquid, in which other substances are dissolved. Water is the most common solvent.

STEL: Short-term exposure limit.

Teratogen: Substance or agent to which exposure of a pregnant female can result in malformation of the fetus.

Threshold Limit Value (TLV): Established by ACGIH. Airborne concentration of a material to which nearly all persons can be exposed day after day, without adverse effects. TLVs are expressed in three ways:

1. TLV-C Ceiling limit: concentration that should not be exceeded even instantaneously.
2. TLV-STEL Short-term exposure limit: maximum concentration for a continuous 15-minute exposure period.
3. TLV-TWA Time-weighted average: concentration for a normal 8-hour work day or 40-hour work week.

Toxicity: Sum of adverse effects resulting from exposure to a material, generally by the mouth, skin, or respiratory tract.

Toxicology: Study of the nature, effects, and detection of poisons in living organisms. Also, substances that are usually harmless but toxic under certain conditions.

Upper Explosive Limit (UEL): Highest concentration (percentage of the substance in air) that will produce a flash of fire when heat, electric arc, or flame is present.

Vapor: Gaseous state of a material suspended in air that would be a liquid or solid under ordinary conditions.

Vapor density: Weight of vapor or gas compared to an equal volume of air; expression of the density of the vapor or gas.

Vapor pressure: Pressure exerted by a saturated vapor above its liquid in a closed container.

Work area: A room or defined space in a workplace where hazardous chemicals are produced or used and where employees are present.

Workplace: An establishment at one geographical location containing one or more work areas.

Appendix B: Safety Data Sheets

The following pages of this appendix contain examples of material safety data sheets (MSDS's) concerning the following chemicals:

MINWAX

PolyForFloors/MW

Material Safety Data Sheet

Document Code: PolyForFloors/MW
Version: 03

Date of Preparation
March 24, 2003

Section 1 - Product and Company Identification

PRODUCT NAME & NUMBERS
MINWAX® Super Fast-Drying Polyurethane for Floors
13020 Gloss
13021 Semi-Gloss
13022 Satin

HMIS CODES
Health 2
Flammability 2
Reactivity 0

MANUFACTURER'S NAME
MINWAX Company
10 Mountainview Road
Upper Saddle River, NJ 07458

EMERGENCY TELEPHONE NO.
(216) 566-2917
INFORMATION TELEPHONE NO.
(800) 523-9299

Section 2 – Composition/Information on Ingredients

% WT.	CAS No.	Ingredient Name				Vapor Pressure
48-49	**64742-88-7**	**Mineral Spirits**				
		ACGIH	TLV	100	ppm	2 mm
		OSHA	PEL	100	ppm	

Section 3 – Hazards Identification

ROUTES OF EXPOSURE
Exposure may be by INHALATION and/or SKIN or EYE contact, depending on conditions of use. To minimize exposure, follow recommendations for proper use, ventilation, and personal protective equipment.

EFFECTS OF OVEREXPOSURE
Irritation of eyes, skin and upper respiratory system. May cause nervous system depression. Extreme overexposure may result in unconsciousness and possibly death.

SIGNS AND SYMPTOMS OF OVEREXPOSURE
Headache, dizziness, nausea, and loss of coordination are indications of excessive exposure to vapors or spray mists. Redness and itching or burning sensation may indicate eye or excessive skin exposure.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
None generally recognized.

CANCER INFORMATION
For Complete Discussion of Toxicology Data Refer to Section 11.

Section 4 – First Aid Measures

If INHALED: If affected, remove from exposure. Restore breathing. Keep warm and quiet.

If on SKIN: Wash affected area thoroughly with soap and water. Remove contaminated clothing and launder before re-use.

If in EYES: Flush eyes with large amounts of water for 15 minutes. Get medical attention.

If SWALLOWED: Do not induce vomiting. Get medical attention immediately.

- Continued -

Section 5 – Fire Fighting Measures

FLASH POINT LEL UEL
110-111 °F PMCC 1.0 6.0
FLAMMABILITY CLASSIFICATION - Combustible, Flash above 99 and below 200 °F
EXTINGUISHING MEDIA - Carbon Dioxide, Dry Chemical, Foam
UNUSUAL FIRE AND EXPLOSION HAZARDS
Closed containers may explode when exposed to extreme heat. Application to hot surfaces requires special precautions. During emergency conditions overexposure to decomposition products may cause a health hazard. Symptoms may not be immediately apparent. Obtain medical attention.
SPECIAL FIRE FIGHTING PROCEDURES
Full protective equipment including self-contained breathing apparatus should be used. Water spray may be ineffective. If water is used, fog nozzles are preferable. Water may be used to cool closed containers to prevent pressure build-up and possible autoignition or explosion when exposed to extreme heat.

Section 6 – Accidental Release Measures

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Remove all sources of ignition. Ventilate the area. Remove with inert absorbent.

Section 7 – Handling and Storage

STORAGE CATEGORY - DOL Storage Class II
PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE
Contents are COMBUSTIBLE. Keep away from heat and open flame. Consult NFPA Code. Use approved Bonding and Grounding procedures. Keep container closed when not in use. Transfer only to approved containers with complete and appropriate labeling. Do not take internally. Keep out of the reach of children.

Section 8 – Exposure Controls/Personal Protection

PRECAUTIONS TO BE TAKEN IN USE
Use only with adequate ventilation. Avoid contact with skin and eyes. Avoid breathing vapor and spray mist. Wash hands after using.
These coatings may contain materials classified as nuisance particulates (listed "as Dust" in Section 2) which may be present at hazardous levels only during sanding or abrading of the dried film. If no specific dusts are listed in Section 2, the applicable limits for nuisance dusts are ACGIH TLV 10 mg./m3 (total dust), 3 mg./m3 (respirable fraction), OSHA PEL 15 mg./m3 (total dust), 5 mg./m3 (respirable fraction).
Removal of old paint by sanding, scraping or other means may generate dust or fumes that contain lead. Exposure to lead dust or fumes may cause brain damage or other adverse health effects, especially in children or pregnant women. Controlling exposure to lead or other hazardous substances requires the use of proper protective equipment, such as a properly fitted respirator (NIOSH approved) and proper containment and cleanup. For more information, call the National Lead Information Center at 1-800-424-LEAD(in US) or contact your local health authority.
VENTILATION
Local exhaust preferable. General exhaust acceptable if the exposure to materials in Section 2 is maintained below applicable exposure limits. Refer to OSHA Standards 1910.94, 1910.107, 1910.108.
RESPIRATORY PROTECTION
If personal exposure cannot be controlled below applicable limits by ventilation, wear a properly fitted organic vapor/particulate respirator approved by NIOSH/MSHA for protection against materials in Section 2.

- Continued -

Section 8 – Exposure Controls/Personal Protection (continued)

When sanding or abrading the dried film, wear a dust/mist respirator approved by NIOSH/MSHA for dust which may be generated from this product, underlying paint, or the abrasive.

PROTECTIVE GLOVES

Wear gloves which are recommended by glove supplier for protection against materials in Section 2.

EYE PROTECTION - Wear safety spectacles with unperforated sideshields.

OTHER PRECAUTIONS

Intentional misuse by deliberately concentrating and inhaling the contents can be harmful or fatal.

Section 9 – Physical and Chemical Properties

PRODUCT WEIGHT	7.37-7.49 lb/gal	EVAPORATION RATE	Slower than Ether
SPECIFIC GRAVITY	0.89-0.90	VAPOR DENSITY	Heavier than Air
BOILING POINT	300-395 °F	MELTING POINT	Not Available
VOLATILE VOLUME	56 %	SOLUBILITY IN WATER	Not Available

VOLATILE ORGANIC COMPOUNDS (VOC Theoretical)

3.7 lb/gal Less Federally Exempt Solvents

3.7 lb/gal Emitted VOC

Section 10 – Stability and Reactivity

STABILITY - Stable

CONDITIONS TO AVOID - None known.

INCOMPATIBILITY - None known.

HAZARDOUS DECOMPOSITION PRODUCTS - By fire: Carbon Dioxide, Carbon Monoxide

HAZARDOUS POLYMERIZATION - Will not occur

Section 11 – Toxicological Information

CHRONIC HEALTH HAZARDS

No ingredient in these products is an IARC, NTP or OSHA listed carcinogen.

Prolonged overexposure to solvent ingredients in Section 2 may cause adverse effects to the liver and urinary systems.

Reports have associated repeated and prolonged overexposure to solvents with permanent brain and nervous system damage.

TOXICOLOGY DATA

CAS No.	Ingredient Name			
64742-88-7	**Mineral Spirits**			
	LC50	RAT	4HR	Not Available
	LD50	RAT		Not Available

Section 12 – Ecological Information

ECOTOXICOLOGICAL INFORMATION - No data available.

Section 13 – Disposal Considerations

WASTE DISPOSAL METHOD

Waste from these products may be hazardous as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR 261. Waste must be tested for ignitability to determine the applicable EPA hazardous waste numbers.

Incinerate in approved facility. Do not incinerate closed container. Dispose of in accordance with Federal, State/Provincial, and Local regulations regarding pollution.

Section 14 – Transport Information - No data available.

- Continued -

Section 15 – Regulatory Information

SARA 313 (40 CFR 372.65C) SUPPLIER NOTIFICATION
No ingredients in these products are subject to SARA 313 (40 CFR 372.65C) Supplier Notification.
CALIFORNIA PROPOSITION 65
WARNING: These products contain chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.
TSCA CERTIFICATION
All chemicals in these products are listed, or are exempt from listing, on the TSCA Inventory.

Section 16 – Other Information

CANADIAN DISTRIBUTOR: Consumer Brands Canada Inc.
200 Confederation Parkway
Vaughn, ON L4K 4T8

NOTE: These products have been classified in accordance with the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR.

The above information pertains to these products as currently formulated, and is based on the information available at this time. Addition of reducers or other additives to these products may substantially alter the composition and hazards of the product. Since conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information.

Material Safety Data Sheet

Revision Number: 000.0 **Issue date:** 06/08/2010

1. PRODUCT AND COMPANY IDENTIFICATION

Product name: **Loctite PL300 Foamboard Construction Adhesive**
Product type: Water based adhesive
IDH number: 1421930 1421941
Region: United States

Company address:
Henkel Corporation
One Henkel Way
Rocky Hill, Connecticut 06067

Contact information:
Telephone: 800.624.7767
Transportation Emergency Telephone: 800.424.9300

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

HMIS:

Physical state:	pasty	**HEALTH:**	1
Color:	Blue	**FLAMMABILITY:**	0
Odor:	Mild, acrylic	**PHYSICAL HAZARD:**	0
		Personal Protection:	See MSDS Section 8

CAUTION: MAY CAUSE EYE AND SKIN IRRITATION.

Relevant routes of exposure: Skin contact

Potential Health Effects

Inhalation: Abrasion of cured material such as by sanding or grinding could release respirable particles of silica quartz, a cancer hazard by inhalation. Normal use of this product causes no such release.
Skin contact: May cause slight irritation to skin.
Eye contact: May cause slight irritation to eyes on contact.
Ingestion: Not expected to be harmful by ingestion. Ingestion of large amounts may produce gastrointestinal disturbances including irritation, nausea, and diarrhea.

Existing conditions aggravated by exposure: None known

This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication).

See Section 11 for additional toxicological information.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous components	CAS NUMBER	%
Quartz (SiO2)	14808-60-7	0.1 - 1

4. FIRST AID MEASURES

Inhalation: No specific treatment is necessary since material is not likely to be hazardous by inhalation.

Skin contact: Wash affected area immediately with soap and water.

Eye contact: Immediately flush eyes with plenty of water for at least 15 minutes. If symptoms develop and persist, get medical attention.

Ingestion: Consult a physician if necessary.

5. FIRE FIGHTING MEASURES

Flash point: not applicable

Autoignition temperature: Not available

Flammable/Explosive limits - lower: Not available

Flammable/Explosive limits - upper: Not available

Extinguishing media: Carbon dioxide, foam, powder Water fog.

Special firefighting procedures: Use water spray to keep fire exposed containers cool and disperse vapors.

Unusual fire or explosion hazards: Closed containers may rupture (due to build up of pressure) when exposed to extreme heat.

Hazardous combustion products: Oxides of carbon. Oxides of nitrogen.

6. ACCIDENTAL RELEASE MEASURES

Use personal protection recommended in Section 8, isolate the hazard area and deny entry to unnecessary and unprotected personnel.

Environmental precautions: Not available

Clean-up methods: Absorb spill with inert material. Shovel material into appropriate container for disposal.

7. HANDLING AND STORAGE

Handling: Avoid prolonged or repeated skin contact with this material. Keep out of the reach of children.

Storage: For safe storage, store at or above 0 °C (32°F)
Keep from freezing. Store in a cool, dry area. Keep containers closed when not in use.

For information on product shelf life, please review labels on container or check the Technical Data Sheet.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Employers should complete an assessment of all workplaces to determine the need for, and selection of, proper exposure controls and protective equipment for each task performed.

Hazardous components	ACGIH TLV	OSHA PEL	AIHA WEEL	OTHER
Quartz (SiO2)	0.025 mg/m3 TWA Respirable fraction.	2.4 MPPCF TWA Respirable. 0.1 mg/m3 TWA Respirable. 0.3 mg/m3 TWA Total dust.	None	None

Engineering controls: Use local ventilation if general ventilation is insufficient to maintain vapor concentration below established exposure limits.

Respiratory protection: No personal respiratory protective equipment normally required.

Eye/face protection: Safety goggles or safety glasses with side shields.

Skin protection: Suitable protective clothing

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state:	pasty
Color:	Blue
Odor:	Mild, acrylic
Odor threshold:	Not available
pH:	7.00 - 7.50
Vapor pressure:	15.0000000 mm hg (20.0 °C (68°F))
Boiling point/range:	100 °C (212°F)
Melting point/ range:	Not available
Specific gravity:	1.224
Vapor density:	Heavier than air
Flash point:	not applicable
Flammable/Explosive limits - lower:	Not available
Flammable/Explosive limits - upper:	Not available
Autoignition temperature:	Not available
Evaporation rate:	< 0.6 (Butyl acetate = 1)
Solubility in water:	Soluble
Partition coefficient (n-octanol/water):	Not available
VOC content:	< 1 %; < 50 g/l (calculated)
Viscosity:	280,000.00 - 380,000.00 mPa.s

10. STABILITY AND REACTIVITY

Stability: Stable under normal conditions of storage and use.

Hazardous reactions: Will not occur.

Hazardous decomposition products: Oxides of carbon. Oxides of nitrogen.

Incompatible materials: None

Conditions to avoid: Heat. Do not freeze.

11. TOXICOLOGICAL INFORMATION

Hazardous components	NTP Carcinogen	IARC Carcinogen	OSHA Carcinogen (Specifically Regulated)
Quartz (SiO2)	Known carcinogen.	Group 1	No

Hazardous components	Health Effects/Target Organs
Quartz (SiO2)	Immune system, Lung, Some evidence of carcinogenicity

12. ECOLOGICAL INFORMATION

Ecological information: Not available

13. DISPOSAL CONSIDERATIONS

Information provided is for unused product only.

Recommended method of disposal: Dispose of according to Federal, State and local governmental regulations.

Hazardous waste number: It is the responsibility of the user to determine if an item is hazardous as defined in the Resource Conservation and Recovery Act (RCRA) at the time of disposal. Product uses, transformations, mixtures, processes, etc., may render the resulting material hazardous, under the criteria of ignitability, corrosivity, reactivity and toxicity characteristics of the Toxicity Characteristics Leaching Procedure (TCLP) 40 CFR 261.20-24.

14. TRANSPORT INFORMATION

U.S. Department of Transportation Ground (49 CFR)

Proper shipping name:	Not regulated
Hazard class or division:	None
Identification number:	None
Packing group:	None

International Air Transportation (ICAO/IATA)

Proper shipping name:	Not regulated
Hazard class or division:	None
Identification number:	None
Packing group:	None

Water Transportation (IMO/IMDG)

Proper shipping name:	Not regulated
Hazard class or division:	None
Identification number:	None
Packing group:	None

15. REGULATORY INFORMATION

United States Regulatory Information

TSCA 8 (b) Inventory Status:	All components are listed or are exempt from listing on the Toxic Substances Control Act Inventory.
TSCA 12(b) Export Notification:	None above reporting de minimus
CERCLA/SARA Section 302 EHS:	None above reporting de minimus
CERCLA/SARA Section 311/312:	Immediate Health, Delayed Health
CERCLA/SARA 313:	None above reporting de minimus
California Proposition 65:	This product contains a chemical known in the State of California to cause cancer. This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

Canada Regulatory Information

CEPA DSL/NDSL Status:	All components are listed on or are exempt from listing on the Canadian Domestic Substances List.

16. OTHER INFORMATION

This material safety data sheet contains changes from the previous version in sections: New Material Safety Data Sheet format., First issue.

Prepared by: Mary Ellen Roddy, Sr. Regulatory Affairs Specialist

DISCLAIMER: The data contained herein are furnished for information only and are believed to be reliable. However, Henkel Corporation does not assume responsibility for any results obtained by persons over whose methods Henkel Corporation has no control. It is the user's responsibility to determine the suitability of Henkel's products or any production methods mentioned herein for a particular purpose, and to adopt such precautions as may be advisable for the protection of property and persons against any hazards that may be involved in the handling and use of any of Henkel Corporation's products. In light of the foregoing, Henkel Corporation specifically disclaims all warranties, express or implied, including warranties of merchantability and fitness for a particular purpose, arising from sale or use of Henkel Corporation's products. Henkel Corporation further disclaims any liability for consequential or incidental damages of any kind, including lost profits.

MATERIAL SAFETY DATA SHEET

B66W561
08 00

DATE OF PREPARATION
Feb 11, 2013

SECTION 1 — PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NUMBER
B66W561
PRODUCT NAME
PRO INDUSTRIAL™ Multi-Surface Acrylic Eg-Shel Coating, Extra White
MANUFACTURER'S NAME
THE SHERWIN-WILLIAMS COMPANY
101 Prospect Avenue N.W.
Cleveland, OH 44115

Telephone Numbers and Websites

Product Information	(800) 524-5979 www.sherwin-williams.com
Regulatory Information	(216) 566-2902 www.paintdocs.com
Medical Emergency	(216) 566-2917
Transportation Emergency*	(800) 424-9300
**for Chemical Emergency ONLY (spill, leak, fire, exposure, or accident)*	

SECTION 2 — COMPOSITION/INFORMATION ON INGREDIENTS

% by Weight	CAS Number	Ingredient	Units	Vapor Pressure
3	**111-76-2**	**2-Butoxyethanol**		
		ACGIH TLV	20 PPM	0.88 mm
		OSHA PEL	25 PPM	
1	**112-34-5**	**2-(2-Butoxyethoxy)-ethanol**		
		ACGIH TLV	Not Available	0.06 mm
		OSHA PEL	Not Available	
2	**112926-00-8**	**Amorphous Precipitated Silica**		
		ACGIH TLV	10 mg/m3 as Dust	
		OSHA PEL	6 mg/m3 as Dust	
24	**13463-67-7**	**Titanium Dioxide**		
		ACGIH TLV	10 mg/m3 as Dust	
		OSHA PEL	10 mg/m3 Total Dust	
		OSHA PEL	5 mg/m3 Respirable Fraction	

SECTION 3 — HAZARDS IDENTIFICATION

ROUTES OF EXPOSURE
INHALATION of vapor or spray mist.
EYE or SKIN contact with the product, vapor or spray mist.

HMIS Codes

Health	2*
Flammability	0
Reactivity	0

EFFECTS OF OVEREXPOSURE
EYES: Irritation.
SKIN: Prolonged or repeated exposure may cause irritation.
INHALATION: Irritation of the upper respiratory system.

In a confined area vapors in high concentration may cause headache, nausea or dizziness.
Prolonged overexposure to hazardous ingredients in Section 2 may cause adverse chronic effects to the following organs or systems:
- the liver
- the urinary system
- the hematopoietic (blood-forming) system

SIGNS AND SYMPTOMS OF OVEREXPOSURE
Redness and itching or burning sensation may indicate eye or excessive skin exposure.
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
None generally recognized.
CANCER INFORMATION
For complete discussion of toxicology data refer to Section 11.

B66W561

SECTION 4 — FIRST AID MEASURES

EYES: Flush eyes with large amounts of water for 15 minutes. Get medical attention.
SKIN: Wash affected area thoroughly with soap and water.
Remove contaminated clothing and launder before re-use.
INHALATION: If affected, remove from exposure. Restore breathing. Keep warm and quiet.
INGESTION: Do not induce vomiting. Get medical attention immediately.

SECTION 5 — FIRE FIGHTING MEASURES

FLASH POINT	LEL	UEL	FLAMMABILITY CLASSIFICATION
Not Applicable	Not Applicable	Not Applicable	Not Applicable

EXTINGUISHING MEDIA
Carbon Dioxide, Dry Chemical, Alcohol Foam

UNUSUAL FIRE AND EXPLOSION HAZARDS
Closed containers may explode (due to the build-up of pressure) when exposed to extreme heat.
During emergency conditions overexposure to decomposition products may cause a health hazard. Symptoms may not be immediately apparent. Obtain medical attention.

SPECIAL FIRE FIGHTING PROCEDURES
Full protective equipment including self-contained breathing apparatus should be used.
Water spray may be ineffective. If water is used, fog nozzles are preferable. Water may be used to cool closed containers to prevent pressure build-up and possible autoignition or explosion when exposed to extreme heat.

SECTION 6 — ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Remove all sources of ignition. Ventilate the area.
Remove with inert absorbent.

SECTION 7 — HANDLING AND STORAGE

STORAGE CATEGORY
Not Applicable

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE
Keep container closed when not in use. Transfer only to approved containers with complete and appropriate labeling. Do not take internally. Keep out of the reach of children.

SECTION 8 — EXPOSURE CONTROLS/PERSONAL PROTECTION

PRECAUTIONS TO BE TAKEN IN USE
Use only with adequate ventilation.
Avoid contact with skin and eyes. Avoid breathing vapor and spray mist.
Wash hands after using.
This coating may contain materials classified as nuisance particulates (listed "as Dust" in Section 2) which may be present at hazardous levels only during sanding or abrading of the dried film. If no specific dusts are listed in Section 2, the applicable limits for nuisance dusts are ACGIH TLV 10 mg/m3 (total dust), 3 mg/m3 (respirable fraction), OSHA PEL 15 mg/m3 (total dust), 5 mg/m3 (respirable fraction).

VENTILATION
Local exhaust preferable. General exhaust acceptable if the exposure to materials in Section 2 is maintained below applicable exposure limits. Refer to OSHA Standards 1910.94, 1910.107, 1910.108.

RESPIRATORY PROTECTION
If personal exposure cannot be controlled below applicable limits by ventilation, wear a properly fitted organic vapor/particulate respirator approved by NIOSH/MSHA for protection against materials in Section 2.
When sanding or abrading the dried film, wear a dust/mist respirator approved by NIOSH/MSHA for dust which may be generated from this product, underlying paint, or the abrasive.

PROTECTIVE GLOVES
Wear gloves which are recommended by glove supplier for protection against materials in Section 2.

EYE PROTECTION
Wear safety spectacles with unperforated sideshields.

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SECTION 9 — PHYSICAL AND CHEMICAL PROPERTIES

PRODUCT WEIGHT	10.54 lb/gal	1262 g/l
SPECIFIC GRAVITY	1.27	
BOILING POINT	212 - 448 °F	100 - 231 °C
MELTING POINT	Not Available	
VOLATILE VOLUME	60%	
EVAPORATION RATE	Slower than ether	
VAPOR DENSITY	Heavier than air	
SOLUBILITY IN WATER	Not Available	
pH	7.5	

VOLATILE ORGANIC COMPOUNDS (VOC Theoretical - As Packaged)

1.06 lb/gal	127 g/l	Less Water and Federally Exempt Solvents
0.48 lb/gal	58 g/l	Emitted VOC

SECTION 10 — STABILITY AND REACTIVITY

STABILITY — Stable
CONDITIONS TO AVOID
None known.
INCOMPATIBILITY
None known.
HAZARDOUS DECOMPOSITION PRODUCTS
By fire: Carbon Dioxide, Carbon Monoxide
HAZARDOUS POLYMERIZATION
Will not occur

SECTION 11 — TOXICOLOGICAL INFORMATION

CHRONIC HEALTH HAZARDS
IARC's Monograph No. 93 reports there is sufficient evidence of carcinogenicity in experimental rats exposed to titanium dioxide but inadequate evidence for carcinogenicity in humans and has assigned a Group 2B rating. In addition, the IARC summary concludes, "No significant exposure to titanium dioxide is thought to occur during the use of products in which titanium is bound to other materials, such as paint."
TOXICOLOGY DATA

CAS No.	Ingredient Name			
111-76-2	**2-Butoxyethanol**			
		LC50 RAT	4HR	Not Available
		LD50 RAT		470 mg/kg
112-34-5	**2-(2-Butoxyethoxy)-ethanol**			
		LC50 RAT	4HR	Not Available
		LD50 RAT		5660 mg/kg
112926-00-8	**Amorphous Precipitated Silica**			
		LC50 RAT	4HR	Not Available
		LD50 RAT		Not Available
13463-67-7	**Titanium Dioxide**			
		LC50 RAT	4HR	Not Available
		LD50 RAT		Not Available

SECTION 12 — ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION
No data available.

SECTION 13 — DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD
Waste from this product is not hazardous as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR 261.
Incinerate in approved facility. Do not incinerate closed container. Dispose of in accordance with Federal, State/Provincial, and Local regulations regarding pollution.

B66W561

SECTION 14 — TRANSPORT INFORMATION

Multi-modal shipping descriptions are provided for informational purposes and do not consider container sizes. The presence of a shipping description for a particular mode of transport (ocean, air, etc.), does not indicate that the product is packaged suitably for that mode of transport. All packaging must be reviewed for suitability prior to shipment, and compliance with the applicable regulations is the sole responsibility of the person offering the product for transport.

US Ground (DOT)
Not Regulated for Transportation.

Canada (TDG)
Not Regulated for Transportation.

IMO
Not Regulated for Transportation.

IATA/ICAO
Not Regulated for Transportation.

SECTION 15 — REGULATORY INFORMATION

SARA 313 *(40 CFR 372.65C)* SUPPLIER NOTIFICATION

CAS No.	CHEMICAL/COMPOUND	% by WT	% Element
	Glycol Ethers	4	

CALIFORNIA PROPOSITION 65
WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

TSCA CERTIFICATION
All chemicals in this product are listed, or are exempt from listing, on the TSCA Inventory.

SECTION 16 — OTHER INFORMATION

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

The above information pertains to this product as currently formulated, and is based on the information available at this time. Addition of reducers or other additives to this product may substantially alter the composition and hazards of the product. Since conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information.

E.C.A.

3M General Offices
3M Center
St. Paul, Minnesota 55144-1000
612/733 1110

Duns No.: 00-617-3082

00-05
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MATERIAL SAFETY
DATA SHEET

3M

DIVISION: ADHESIVES, COATINGS AND SEALERS
TRADE NAME:
FASTBOND (TM) 900 Duct Sealer/New Formula
3M I.D. NUMBER: 62-5530-5230-9 62-5530-7530-0 62-5530-8530-9 62-5530-9530-8

ISSUED: AUGUST 31, 1989
SUPERSEDES: APRIL 12, 1989
DOCUMENT: 10-3093-1

1. INGREDIENT	C.A.S. NO.	PERCENT	EXPOSURE LIMITS VALUE UNIT	TYPE AUTH
aluminum silicate, hydrous	1332-58-7	30.0 - 40.0	10 mg/m3	TWA ACGIH
n-hexane	110-54-3	30.0 - 40.0	50 ppm	TWA ACGIH
styrene-butadiene copolymer	9003-55-8	10.0 - 20.0	NONE NONE	NONE NONE
hydrocarbon resin	64742-16-1	1.0 - 10.0	NONE NONE	NONE NONE
rosin ester - Vendor Trade Secret (V.T.S.)	V.T.S.	1.0 - 10.0	NONE NONE	NONE NONE
calcium magnesium carbonate	1317-65-3	1.0 - 10.0	10 mg/m3	TWA ACGIH

SOURCE OF EXPOSURE LIMIT DATA:
- ACGIH: American Conference of Governmental Industrial Hygienists
- NONE: None Established

2. PHYSICAL DATA

BOILING POINT:..... 148.00 F
VAPOR PRESSURE:..... 126.5000 mmHg @ 68F
VAPOR DENSITY: ..... 2.97 Air = 1
EVAPORATION RATE:..... 1.90 Ether = 1
SOLUBILITY IN WATER: ..... Nil
SP. GRAVITY:..... 1.090 Water = 1
PERCENT VOLATILE: ..... ca. 35.00 %
VOLATILE ORGANICS: ..... 356.00 gm/l
pH: ..... N/A
VISCOSITY: ..... ca. 250000.0 CPS
APPEARANCE AND ODOR: Gray, smooth, buttery mastic, with mild solvent odor

3. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT:..... -10.00 F T.C.C.
FLAMMABLE LIMITS - LEL: ..... 1.20 %
FLAMMABLE LIMITS - UEL: ..... 6.90 %
AUTOIGNITION TEMPERATURE: ... N/D
EXTINGUISHING MEDIA:
Foam, dry chemical
SPECIAL FIRE FIGHTING PROCEDURES:
Fire fighters should be equipped with self-contained breathing apparatus when fighting fires involving this material. Water may be used to cool and protect exposed containers.
UNUSUAL FIRE AND EXPLOSION HAZARDS:
Overheated, closed containers adjacent to fire could explode due to internal pressure buildup. Vapors may ignite explosively at ambient temperatures. Vapors are heavier than air and may travel long distances to a source of ignition and flash back.
NFPA-HAZARD-CODES: HEALTH 3 FIRE 4 REACTIVITY 0
UNUSUAL REACTION HAZARD: None

Abbreviations: N/D - Not Determined N/A - Not Applicable

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MATERIAL SAFETY
DATA SHEET

3M

MSDS: FASTBOND (TM) 900 Duct Sealer/New Formula
AUGUST 31, 1989 PAGE: 2 of 4

4. REACTIVITY DATA

STABILITY: Stable
INCOMPATIBILITY - MATERIALS TO AVOID:
N/A
CONDITIONS TO AVOID: Avoid contact with strong oxidizing agents, acids, bases, amines and elevated temperatures.
HAZARDOUS POLYMERIZATION: Will Not Occur
HAZARDOUS DECOMPOSITION PRODUCTS:
CO, CO2 and smoke particles when subjected to excessive heat or flame.

5. ENVIRONMENTAL INFORMATION

SPILL RESPONSE:
Extinguish all ignition sources. Ventilate the area. Observe precautions from other sections. Collect spilled material. Place in a U.S. Department of Transportation - approved metal container, and seal.

RECOMMENDED DISPOSAL:
Incinerate bulk product after mixing with flammable material in a licensed hazardous waste facility. Disposal should be in accordance with applicable regulations. U.S. EPA Hazardous Waste Number: D001 (Ignitable).

ENVIRONMENTAL DATA:
Volatile Organic Compound (VOC):
Maximum VOC = 356 grams/liter.
Maximum VOC minus Water minus Exempt Solvents = 356 grams/liter.

SARA HAZARD CLASS:
FIRE HAZARD: Yes PRESSURE: No REACTIVITY: No ACUTE: Yes CHRONIC: Yes

6. SUGGESTED FIRST AID

EYE CONTACT:
Flush eyes with plenty of water for at least 10 minutes. Call a physician.

SKIN CONTACT:
Wash affected area with soap and water.

INHALATION:
Move to fresh air if symptoms occur. If breathing is difficult get medical attention

IF SWALLOWED:
Do not induce vomiting. Immediately call a physician or poison control center.

OTHER FIRST AID:
NONE

Abbreviations: N/D - Not [illegible] mi N/A - Not Applicable

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MATERIAL SAFETY
DATA SHEET

3M

MSDS: FASTBOND (TM) 900 Duct Sealer/New Formula
AUGUST 31, 1989

7. PRECAUTIONARY INFORMATION

FOR INDUSTRIAL OR PROFESSIONAL USE ONLY. Keep away from heat, sparks, flames, and all other sources of ignition. The vapors released from the product can be ignited easily. Avoid prolonged breathing of vapors. Use only in areas with sufficient ventilation to maintain vapor concentrations below recommended exposure limits Provide local exhaust ventilation if necessary. Keep container closed when not in use. Prevent eye and skin contact. Use eye (e.g., safety glasses, chemical goggles) and skin (e.g., impervious gloves) protection. Keep out of the reach of children.

ADDITIONAL EXPOSURE LIMITS

INGREDIENTS	EXPOSURE LIMITS VALUE	UNIT	TYPE	AUTH
aluminum silicate, hydrous	10	mg/m3	TWA	OSHA
n-hexane	180	mg/m3	TWA	ACGIH
n-hexane	50	ppm	TWA	OSHA
n-hexane	180	mg/m3	TWA	OSHA
calcium magnesium carbonate	15	mg/m3	TWA	OSHA

SOURCE OF EXPOSURE LIMIT DATA:
- ACGIH: American Conference of Governmental Industrial Hygienists
- OSHA: Occupational Safety and Health Administration

8. HEALTH HAZARD DATA

EYE CONTACT: Liquid and vapor may cause eye irritation.

SKIN CONTACT: Prolonged skin exposure may defat skin leading to irritation and dermatitis. (n-hexane can be absorbed through the skin in harmful amounts. Due to the physical nature of the product this effect is not anticipated.)

INHALATION: Vapor overexposure may cause respiratory irritation and temporary nervous system impairment. Symptoms may include drowsiness, dizziness, headache and nausea. Extreme or repeated overexposure may cause nervous system damage.

INGESTION: May cause digestive system irritation and nervous system impairment. Symptoms may include nausea, diarrhea and vomiting. Solvent aspiration into the lung as a result of vomiting may cause lung damage.

SECTION CHANGE DATES

INGREDIENTS	**SECTION CHANGED SINCE**	**APRIL 12, 1989 ISSUE**
FIRE & EXP. DATA	**SECTION CHANGED SINCE**	**APRIL 12, 1989 ISSUE**
FIRST AID	**SECTION CHANGED SINCE**	**APRIL 12, 1989 ISSUE**
PRECAUT. INFO.	**SECTION CHANGED SINCE**	**APRIL 12, 1989 ISSUE**

Abbreviations: N/D - Not Determined N/A - Not Applicable

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MATERIAL SAFETY
DATA SHEET

3M

MSDS: FASTBOND (TM) 900 Duct Sealer/New Formula
AUGUST 31, 1989

SECTION CHANGE DATES (continued)

HEALTH HAZD. DATA SECTION CHANGED SINCE APRIL 12, 1989 ISSUE

Abbreviations: N/D - Not Determined N/A - Not Applicable

The information on this Data Sheet represents our current data and best opinion as to the proper use in handling of this material under normal conditions. Any use of the material which is not in conformance with this Data Sheet or which involves using the material in combination with any other material or any other process is the responsibility of the user.

Material Safety Data Sheet

Sikaflex Crack Flex Sealant

1 . Product and company identification

Product name Sikaflex Crack Flex Sealant

Supplier : Sika Corporation, Construction
201 Polito Avenue
Lyndhurst, NJ 07071
www.sikausa.com

Telephone no. : (201) 933 - 8800

Fax no. : (201) 804 - 1076

In case of emergency : CHEMTREC: 800-424-9300
INTERNATIONAL: 703-527-3887

Manufacturer : Sika Corporation, Operations
201 Polito Avenue
Lyndhurst, NJ 07071
www.sikausa.com

Telephone no. : (201) 933 - 8800

Validation date : **8. December 2011.**

Print date : 8. December 2011.

Product type : Liquid.

2 . Composition/information on ingredients

Name	CAS number	%
3-isocyanatomethyl-3,5,5-trimethylcyclohexyl isocyanate	4098-71-9	10 - 30
xylene	1330-20-7	1 - 5
calcium hydroxide	1305-62-0	0.5 - 1.5
ethylbenzene	100-41-4	<1

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

3 . Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Potential acute health effects

Inhalation : Irritating to respiratory system.

Ingestion : Harmful if swallowed.

Skin : May cause skin irritation.

Eyes : May cause eye irritation.

See toxicological information (Section 11)

4 . First aid measures

Eye contact : Check for and remove any contact lenses. Get medical attention. Immediately flush eyes with plenty of water for at least 15 minutes.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse.

Sikaflex Crack Flex Sealant

4 . First aid measures

Inhalation : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. Maintain an open airway. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Ingestion : Wash out mouth with water. Move exposed person to fresh air. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Do not induce vomiting unless directed to do so by medical personnel. Get medical attention. Never give anything by mouth to an unconscious person.

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

5 . Fire-fighting measures

Flammability of the product : Combustible liquid. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

Extinguishing media

Suitable : Use dry chemical, CO_2, water spray (fog) or foam.

Not suitable : Do not use water jet.

Special exposure hazards : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Hazardous combustion products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides
halogenated compounds
metal oxide/oxides

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

6 . Accidental release measures

Personal precautions : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see Section 8).

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Large spill : Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

Sikaflex Crack Flex Sealant

6 . Accidental release measures

Small spill : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble or absorb with an inert dry material and place in an appropriate waste disposal container. Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor.

7 . Handling and storage

Handling : Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Do not get in eyes or on skin or clothing. Do not ingest. Avoid breathing vapor or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use non-sparking tools. Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Empty containers retain product residue and can be hazardous. Do not reuse container.

Storage : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

8 . Exposure controls/personal protection

Product name	Exposure limits
3-isocyanatomethyl-3,5,5-trimethylcyclohexyl isocyanate	**ACGIH TLV (United States, 1/2007).** TWA: 0.005 ppm 8 hour(s). **NIOSH REL (United States, 12/2001). Skin** STEL: 0.18 mg/m³ 15 minute(s). STEL: 0.02 ppm 15 minute(s). TWA: 0.045 mg/m³ 10 hour(s). TWA: 0.005 ppm 10 hour(s). **OSHA PEL 1989 (United States, 3/1989). Skin** STEL: 0.02 ppm 15 minute(s). TWA: 0.01 ppm 8 hour(s).
xylene	**ACGIH TLV (United States, 1/2007).** STEL: 651 mg/m³ 15 minute(s). STEL: 150 ppm 15 minute(s). TWA: 434 mg/m³ 8 hour(s). TWA: 100 ppm 8 hour(s). **OSHA PEL (United States, 11/2006).** TWA: 435 mg/m³ 8 hour(s). TWA: 100 ppm 8 hour(s). **OSHA PEL 1989 (United States, 3/1989).** STEL: 655 mg/m³ 15 minute(s). STEL: 150 ppm 15 minute(s). TWA: 435 mg/m³ 8 hour(s). TWA: 100 ppm 8 hour(s).
ethylbenzene	**ACGIH TLV (United States, 1/2007). Notes: Substances for which there is a Biological Exposure Index or Indices 2002 Adoption.**

Sikaflex Crack Flex Sealant

8 . Exposure controls/personal protection

STEL: 125 ppm 15 minute(s).
TWA: 100 ppm 8 hour(s).

NIOSH REL (United States, 12/2001).
STEL: 545 mg/m³ 15 minute(s).
STEL: 125 ppm 15 minute(s).
TWA: 435 mg/m³ 10 hour(s).
TWA: 100 ppm 10 hour(s).

OSHA PEL (United States, 11/2006).
TWA: 435 mg/m³ 8 hour(s).
TWA: 100 ppm 8 hour(s).

OSHA PEL 1989 (United States, 3/1989).
STEL: 545 mg/m³ 15 minute(s).
STEL: 125 ppm 15 minute(s).
TWA: 435 mg/m³ 8 hour(s).
TWA: 100 ppm 8 hour(s).

Engineering measures : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protection

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

9 . Physical and chemical properties

Physical state : Viscous liquid.
Flash point : Closed cup: 91°C (195.8°F)
Color : Gray.
Odor : Aromatic.
Density : ~1.185 g/cm³
VOC : 51.6 g/l

Sikaflex Crack Flex Sealant

10 . Stability and reactivity

Stability : The product is stable.

Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.

Materials to avoid : Reactive or incompatible with the following materials:
oxidizing materials

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

11 . Toxicological information

Potential chronic health effects

Chronic effects : May cause sensitization by inhalation. May cause sensitization by skin contact.

Carcinogenicity : Contains material which may cause cancer, based on animal data. Risk of cancer depends on duration and level of exposure. Reports have associated repeated and prolonged exposure to some of the chemicals in this product with permanent brain, liver, kidney and nervous system damage. Intentional misuse by deliberate concentration and inhalation of vapors may be harmful or fatal.

Acute toxicity

Conclusion/Summary : Not available.

Carcinogenicity

Classification

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
xylene	A4	3	-	-	-	-
ethylbenzene	A3	2B	-	-	-	-

12 . Ecological information

Environmental effects : No known significant effects or critical hazards.

13 . Disposal considerations

Waste disposal : The generation of waste should be avoided or minimized wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14 . Transport information

Sikaflex Crack Flex Sealant

14 . Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Additional information
DOT Classification	Not regulated.		-	-	-
TDG Classification	Not regulated.		-	-	-
ADR/RID Class	Not regulated.		-	-	-
IMDG Class	Not regulated.		-	-	-
IATA-DGR Class	Not regulated.		-	-	-

PG* : Packing group

15 . Regulatory information

U.S. Federal regulations : **United States inventory (TSCA 8b):** All components are listed or exempted.

SARA 302/304/311/312 extremely hazardous substances: No products were found.
SARA 302/304 emergency planning and notification: No products were found.
SARA 302/304/311/312 hazardous chemicals: xylene; calcium carbonate; Ethene, chloro-, homopolymer; titanium dioxide
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: xylene: Fire hazard, Immediate (acute) health hazard, Delayed (chronic) health hazard; calcium carbonate: Immediate (acute) health hazard; Ethene, chloro-, homopolymer: Delayed (chronic) health hazard; titanium dioxide: Immediate (acute) health hazard

Clean Water Act (CWA) 307: ethylbenzene; vinyl chloride

Clean Water Act (CWA) 311: xylene; ethylbenzene

Clean Air Act (CAA) 112 accidental release prevention: vinyl chloride

Clean Air Act (CAA) 112 regulated flammable substances: vinyl chloride

Clean Air Act (CAA) 112 regulated toxic substances: No products were found.

SARA 313

Form R - Reporting requirements :

Product name	CAS number	Concentration
xylene	1330-20-7	1 - 5
ethylbenzene	100-41-4	<1

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

State regulations :

Massachusetts Substances: The following components are listed: TITANIUM DIOXIDE; XYLENE

New Jersey Hazardous Substances: The following components are listed: TITANIUM DIOXIDE; ETHYL BENZENE; XYLENES

New York Acutely Hazardous Substances: The following components are listed: Ethylbenzene; Xylene (mixed)

Pennsylvania RTK Hazardous Substances: The following components are listed: TITANIUM OXIDE (TIO2); BENZENE, ETHYL-; BENZENE, DIMETHYL-

California Prop. 65

WARNING: This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.

Sikaflex Crack Flex Sealant

15 . Regulatory information

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
1,2-Benzenedicarboxylic acid, di-C9-11-branched alkyl esters, C10-rich	No.	Yes.	No.	No.
ethylbenzene	Yes.	No.	No.	No.

United States inventory (TSCA 8b) : All components are listed or exempted.

16 . Other information

Hazardous Material Information System (U.S.A.) :

Health	*	2
Flammability		2
Physical hazards		0
Personal Protection Equipment		C

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on MSDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

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Version : **1.04**

Indicates information that has changed from previously issued version.

Notice to reader

The information contained in this Material Safety Data Sheet applies only to the actual Sika Corporation ("Sika") product identified and described herein. This information is not intended to address, nor does it address the use or application of the identified Sika product in combination with any other material, product or process. All of the information set forth herein is based on technical data regarding the identified product that Sika believes to be reliable as of the date hereof. Prior to each use of any Sika product, the user must always read and follow the warnings and instructions on the product's current Technical Data Sheet, product label and Material Safety Data Sheet for each Sika product, which are available at web site and/or telephone number listed in Section 1 of this MSDS.

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DURAPAX™
COAL TAR
COMMERCIAL ROOFING SYSTEMS

400 Old Reading Pike, Ste 304
Pottstown, PA 19464
Tel: 610-579-9075
Fax: 610-323-0115
www.durapax.com

MATERIAL SAFETY DATA SHEET

COAL TAR ROOFING PITCH

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: COAL TAR ROOFING PITCH

OTHER/GENERIC NAMES: Roofing Pitch

PRODUCT USE: Commercial/Industrial Roofing

MANUFACTURER: Durapax LLC
Commercial Roofing Systems
400 Old Reading Pike, Suite 304
Pottstown PA 19464

FOR MORE INFORMATION CALL:
(Monday-Friday, 8:00am-4:30pm EST)
1-610-579-9075

IN CASE OF EMERGENCY CALL:
(24 Hours/Day, 7 Days/Week)
1-610-579-9075
Chemtrec 1-800-424-9300

2. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT NAME	CAS NUMBER	WEIGHT %
Coal Tar Pitch*	65996-93-2	100

* Mixture of organic compounds, primarily 3 to 40 ringed polynuclear aromatic hydrocarbons, including some substituted compounds. It is estimated that as many as 4500+ compounds may be present.

Trace impurities and additional material names not listed above may also appear in Section 15 towards the end of the MSDS. These materials may be listed for local "Right-To-Know" compliance and for other reasons.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Vapor can cause moderate to severe irritation of eyes, nose, throat and respiratory tract. Can cause burning and itching with reddening of the skin, which is accentuated by sunlight. Burning may emit hazardous fumes, which can form flammable or explosive mixtures.

POTENTIAL HEALTH HAZARDS

SKIN: Contact with skin can result in irritation, which when not washed off or when accentuated by sunlight, can result in minor burns. Contact with heated or molten material can cause severe thermal burns.

MATERIAL SAFETY DATA SHEET
Coal Tar Roofing Pitch

EYES: Overexposure to product fumes, vapors or dust can result in irritation and burning. Eye contact with product will result in irritation, which in the absence of recommended first aid can result in effects ranging from minor burns to severe corneal injury, including keratitis, conjunctivitis and corneal abrasion. Contact with heated material may cause thermal burns.

INHALATION: Overexposure to fumes, vapor or dust may result in irritation to respiratory tract. Prolonged exposure in significant excess of permissible air concentrations can result in acute toxic effects, such as coughing, sneezing, headache, dizziness, respiratory difficulty and convulsions.

INGESTION: Irritation of the gastrointestinal tract followed by nausea and vomiting, abdominal discomfort, rapid pulse, etc.

OTHER: Individuals with chronic respiratory disorders, a history of central nervous system (CNS) functional illness or preexisting skin disorders may be more susceptible to the effects of exposure when working with this material.

DELAYED EFFECTS: Prolonged and repeated skin exposure over many months to years, in the absence of recommended hygiene practices, may lead to changes in skin pigmentation and benign skin growths. In some cases, skin cancer may occur after many years of exposure. These effects appear to be exacerbated by simultaneous exposure to ultraviolet light (sunlight). Long term exposure to coal tar pitch volatiles has been associated with the development of skin, kidney, bladder, scrotum and lung cancer.

Ingredients found on one of the OSHA designated carcinogen lists are listed below.

INGREDIENT NAME	NTP STATUS	IARC STATUS	OSHA LIST
Coal Tar Pitch	Known Carcinogen	1 – Known	Carcinogen

4. FIRST AID MEASURES

SKIN: For contact with **MOLTEN** product, do not remove contaminated clothing. Immediately flush skin with large amounts of cold water. If possible, submerge area in cold water. Pack with ice and seek immediate medical attention. For other contact, remove contaminated clothing and wash thoroughly with waterless hand cleaners, olive oil or nonabrasive soap and water. Avoid solvents.

EYES: Flush eyes immediately with large amounts of water or olive oil for at least 15 minutes. Call a physician.

INHALATION: Remove immediately to fresh air. If not breathing, give artificial respiration; preferably mouth-to-mouth. If breathing is difficult, give oxygen. Call a physician.

INGESTION: If conscious, first induce vomiting, then take 2 tablespoons of activated charcoal (USP-drug grade) in water. Do not give anything by mouth to an unconscious person. Get immediate medical attention.

ADVICE TO PHYSICIAN: None

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT: 190 °C (374 °F) [minimum]
FLASH POINT METHOD: Pensky-Martens Closed Cup
AUTOIGNITION TEMPERATURE: >399 °C (750 °F)

MATERIAL SAFETY DATA SHEET
Coal Tar Roofing Pitch

UPPER FLAME LIMIT (volume % in air): Not Determined
LOWER FLAME LIMIT (volume % in air): Not Determined
FLAME PROPAGATION RATE (solids): Not Applicable
OSHA FLAMMABILITY CLASS: Not Determined

EXTINGUISHING MEDIA: Water fog, carbon dioxide, foam, dry chemicals, sand or steam

UNUSUAL FIRE AND EXPLOSION HAZARDS: Sensitive to static discharge. Burning may emit hazardous fumes/vapors which may be in concentrations greater than PEL/TLV's. Coal tar pitch at elevated temperatures may generate vapors that can form flammable/explosive mixtures in the presence of air and a source of ignition. Airborne pitch dust may form explosive mixtures with air. Cloud ignition temperature is 710 °C (1310 °F) minimum. Explosive concentration (dust) is 0.035 ounces/ft^3 (1000 mg/0.03m^3). Closed containers may explode when exposed to extreme heat. Liquid (molten) pitch at elevated temperatures will sustain combustion.

SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS: Wear complete fire service protection equipment, including full-face NIOSH/MSHA approved self-contained breathing apparatus. Use water or water spray to cool fire-exposed containers and structures and to protect personnel. Water/fog can control unconfined pitch fires, but may cause frothing or eruption in closed tanks.

6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE: (Always wear recommended personal protective equipment.)

Avoid breathing vapors and contact with skin and eyes. Avoid contact with hot liquid/fumes/vapors. Avoid sources of ignition (sparks or open flame). Try to stop the source of the leak, if possible, without hazard. Ventilate the area if spill occurs indoors. If hot liquid is spilled, contain by diking/berming with absorbent solids, such as sand, earth, or other inert material. Use of water spray will aid in solidifying molten material and minimize vapor emissions. Release or spillage of solid pitch can be managed as a coal spillage and recovery made avoiding skin and eye contact. Shovel material into dry, labeled containers and secure cover. Contain runoff of fire control water. Do not allow to enter into sewers, waterways or open bodies of water.

Provide cleanup personnel with appropriate protective clothing. Contaminated materials may need to be handled and managed as RCRA Hazardous Waste and treated before disposal in approved facilities (see Section 13). In cases involving release to the environment in the U.S., report releases to Federal, State and Local authorities, as required. Due to the concentration of Benzo(a)pyrene in coal tar pitch and a reportable quantity (RQ) of one (1) pound for this compound, CERCLA (Superfund) release of approximately 18 gallons (200 pounds) of coal tar pitch requires National Response Center notification.

Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.

7. HANDLING AND STORAGE

NORMAL HANDLING: (Always wear recommended personal protective equipment.)

Avoid prolonged and repeated contact with skin or breathing of dust/fumes/vapors. Avoid creating aerosols. Avoid contact with molten materials. Wear clothing closed at the neck, long sleeves and cotton, leather or non-porous type gloves, [e.g. neoprene, butyl rubber, nitrile, polyvinyl alcohol (PVA), polyvinyl chloride (PVC)].

STORAGE RECOMMENDATIONS:

Recommended temperature for storage is 50 °C (122 °F) above the softening point.

MATERIAL SAFETY DATA SHEET
Coal Tar Roofing Pitch

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: Use in areas with adequate natural ventilation or provide sufficient general/local exhaust ventilation in pattern/volume to maintain concentrations below the recommended PEL/TLV and to maintain areas below flammable vapor or explosive dust concentrations.

PERSONAL PROTECTIVE EQUIPMENT

SKIN PROTECTION: Avoid skin contact, whenever possible by using gloves. For exposed skin, use protective creams (for example; MSA's Fend AE-2, Kerodex 51, Jergens SBS-46). Protect exposed skin from direct sunlight. For outdoor work use approved waterproof sunscreens with a SPF 25 or greater; reapply every 90 minutes while in direct sun.

EYE PROTECTION: Safety glasses (with side shields), goggles and/or face shield. Chemical splash goggles or face shield are highly recommended when handling molten material. Do not wear contact lenses when handling this material.

RESPIRATORY PROTECTION: Use a NIOSH/MSHA approved respirator with suitable cartridge (organic vapor/high efficiency particulate air filter) as necessary to control exposures to levels below the TLV or PEL. Not required for properly ventilated areas.

ADDITIONAL RECOMMENDATIONS: Work clothing should be laundered separately from other household clothing. Wash exposed areas thoroughly before eating, drinking, using tobacco products or using a restroom. It is recommended that a complete soap and water shower and/or steam bath be taken at the end of each working day.

EXPOSURE GUIDELINES

INGREDIENT NAME	ACGIH TLV	OSHA PEL	OTHER LIMIT
Coal Tar Pitch Volatiles, CTPV	0.2mg/m^3	0.2mg/m^3	- - -

* = Workplace Environmental Exposure Level (AIHA).
** = Biological Exposure Index (ACGIH).

OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS: None

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE:	Black solid (at 70 °F) or black viscous liquid		
MOLECULAR WEIGHT:	700 – 900		
CHEMICAL FORMULA:	Mixture of organic compounds		
ODOR:	Aromatic		
SPECIFIC GRAVITY (water = 1.0):	1.3 ± 0.04 @ 15.5 °C (60 °F)		
SOLUBILITY IN WATER (weight %):	Negligible		
pH:	Not Applicable		
BOILING POINT:	>240 °C (464 °F)		
MELTING POINT:	41 – 64 °C (106 – 147 °F)		
VAPOR PRESSURE:	None at 20 °C (68 °F)		
VAPOR DENSITY (air = 1.0):	>1		
EVAPORATION RATE:	<1	**COMPARED TO:**	Butyl Acetate = 1
% VOLATILES:	Not Determined		
FLASH POINT:	190 °C (374 °F) [minimum]		

(Flash point method and additional flammability data are found in Section 5.)

MATERIAL SAFETY DATA SHEET
Coal Tar Roofing Pitch

10. STABILITY AND REACTIVITY

NORMALLY STABLE? (CONDITIONS TO AVOID): Product stable under normal conditions. Avoid loading or unloading near open flame.

INCOMPATIBILITIES: Avoid contact with water when confined and in a molten state. Avoid contact with strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose under normal conditions of use. Upon excessive heating or burning, the material decomposes, and may emit hazardous fumes/vapors of lower molecular weight compounds, CO_2, CO, NO_x, and SO_2.

HAZARDOUS POLYMERIZATION: Will not occur.

11. TOXICOLOGICAL INFORMATION

IMMEDIATE (ACUTE) EFFECTS: Refer to Section 3.

DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS: Long term exposure to Coal Tar Pitch Volatiles (CTPV), above the recommended exposure limit, has been associated with the development of skin, kidney, lung, bladder, and scrotum cancer.

OTHER DATA: IARC Group 1 – Sufficient evidence of carcinogenicity in humans. No scientific study supports an association between coal tar pitch exposure and human reproductive hazards. Available data characterizes coal tar pitch as a mutagen.

12. ECOLOGICAL INFORMATION

Not determined.

13. DISPOSAL CONSIDERATIONS

RCRA

Is the unused product a RCRA hazardous waste if discarded? NO
If yes, the RCRA ID number is: Not Applicable

OTHER DISPOSAL CONSIDERATIONS:

In the U.S., dispose of the material as required by applicable federal, state and local regulations. In Canada, dispose of the material in accordance with provincial regulations.

The information offered here is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

MATERIAL SAFETY DATA SHEET
Coal Tar Roofing Pitch

14. TRANSPORT INFORMATION

SOLID:
US DOT HAZARD CLASS: UN 3077
US DOT ID NUMBER: RQ, Environmentally Hazardous Substance, Solid, N.O.S., (Benzo(a)pyrene, Dibenz(a,h)anthracene), 9, UN 3077, III

RQ, Other Regulated Substance, Solid, N.O.S., (Benzo(a)pyrene, Dibenz(a,h)anthracene), 9, NA 3077, III

For Domestic Shipments: either shipping name
For Marine Shipments: Use UN 3077, Environmentally Hazardous Substance shipping name

LIQUID (Transported above flash point):
US DOT HAZARD CLASS: UN 3256
US DOT ID NUMBER: RQ, Elevated Temperature Liquid, Flammable, N.O.S., (Benzo(a)pyrene, Dibenz(a,h)anthracene), 3, UN 3256, III

LIQUID (Transported below flash point):
US DOT HAZARD CLASS: UN 3257
US DOT ID NUMBER: RQ, Elevated Temperature Liquid, Flammable, N.O.S., (Benzo(a)pyrene, Dibenz(a,h)anthracene), 9, UN 3257, III

For additional information on shipping regulations affecting this material, contact the information number found in Section 1.

15. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS: Listed on EPA's TSCA Inventory
OTHER TSCA ISSUES: Substance of unknown or variable composition

SARA TITLE III/CERCLA

The following substances are considered hazardous by one or more regulatory agencies and were identified in "typical" coal tar pitch samples at concentrations greater than 0.01 percent by weight.

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

INGREDIENT NAME	CAS #	SARA/CERCLA RQ (lb)	SARA EHS TPQ (lb)
Acenaphthene	83-32-9	100	
Anthracene	120-12-7	5000	
Benzo(a)anthracene	56-55-3	10	
Benzo(c)acridine	225-51-4	100	
Benzo(b)fluoranthene	205-99-2	1	
Benzo(k)fluoranthene	207-08-9	5000	
Benzo(j)fluoranthene	205-82-3	- - -	
Benzo(g,h,i)perylene	191-24-2	5000	
Benzo(a)pyrene	50-32-8	1	
Benzo(e)pyrene	192-97-2	- - -	
Chrysene	218-01-9	100	

MATERIAL SAFETY DATA SHEET
Coal Tar Roofing Pitch

Dibenz(a,h)anthracene	53-70-3	1	
Dibenzofuran	132-64-9	100	
Fluoranthene	206-44-0	100	
Fluorene	86-73-7	5000	
Indeno(1,2,3-cd)pyrene	193-39-5	100	
2-Methylnaphthalene	91-57-6	- - -	
Naphthalene	91-20-3	100	
Phenanthrene	85-01-8	5000	
Pyrene	129-00-0	5000	1000/10,000*

* *See 40 CFR 355.30(2)(i)*

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center [(800) 424-8802] and to your Local Emergency Planning Committee.

SECTION 311 HAZARD CLASS: Immediate, Delayed, Fire

SARA 313 TOXIC CHEMICALS:
The following ingredients are SARA 313 "Toxic Chemicals". Also see Section 2.

INGREDIENT NAME	CAS #	*WEIGHT %*
*Benzo(a)anthracene	56-55-3	0.7
*Benzo(a)pyrene	50-32-8	0.4
*Benzo(b)fluoranthene	205-99-2	0.8 (includes (k))
*Benzo(k)fluoranthene	207-08-9	included above
*Benzo(j)fluoranthene	205-82-3	0.2
*Benzo(g,h,i)perylene	191-24-2	0.2
*Chrysene	218-01-9	0.2
*Indeno(1,2,3-cd)pyrene	193-39-5	0.2
Phenanthrene	85-01-8	1.8
Polycyclic Aromatic Compounds (20 compounds)	-	3.2

* Also included in “polycyclic aromatic compound” category

STATE RIGHT-TO-KNOW

In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

INGREDIENT NAME	WEIGHT %	COMMENT
No ingredients listed in this section		

ADDITIONAL REGULATORY INFORMATION: California Proposition 65 material - Contains chemicals known to the State of California to cause cancer, birth defects, & other reproductive harm.

WHMIS CLASSIFICATION (CANADA): Class D, Division 2, Subdivision A
Class D, Division 2, Subdivision B

This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by the Controlled Products Regulations.

MATERIAL SAFETY DATA SHEET
Coal Tar Roofing Pitch

FOREIGN INVENTORY STATUS: Listed on the EINECS Inventory – ID# 2660282
Listed on Canadian Inventory Domestic Substance List (DSL)

16. OTHER INFORMATION

CURRENT ISSUE DATE: April 2005
PREVIOUS ISSUE DATE:

CHANGES TO MSDS FROM PREVIOUS ISSUE DATE ARE DUE TO THE FOLLOWING:
None

Answers from page 18-19 "Activity: Reviewing an SDS"

1. What health effects may be experienced when using this product?

MinWax polyurethane: irritation of eyes, skin and upper respiratory system; nervous system depression; extreme overexposure may cause unconsciousness and possibly death.
Loctite adhesive: slight irritation to skin and eyes; nausea and diarrhea from ingesting large quantities.
Sherwin Williams paint: irritation of eyes, skin and upper respiratory system; headache, nausea and dizziness in high concentrations.
3M Fastbond sealer: eye and skin irritation and dermatitis; drowsiness, dizziness, headache and nausea.
Sikaflex sealant: respiratory tract, skin and eye irritation; harmful if swallowed; CNS depression and possible cancer hazard, based on animal data.
Durapax roofing pitch: eye and respiratory system irritation and possibly difficulty breathing; coughing, sneezing, headache; dizziness; skin pigmentation; long-term exposures can cause skin, kidney, bladder, scrotum and lung cancer.

2. Are exposures likely to be over the OELs? The PELs?

MinWax polyurethane: Both ACGIH Threshold Limit Value and OSHA PEL are 100 ppm. The available data is 31 ppm, less than 1/3 rd of PEL, but it was a 15 minute sample. Samples should be taken to cover an 8 hour work-day so more should be taken.
Loctite adhesive: ACGIH TLV is 0.025 mg/m3 and OSHA PEL is 0.1 mg/m3; the exposure results were below the lowest benchmark, the TLV. The "less than" indicates that the result is below what the lab can reliably measure so these exposures are quite low for gluing. How about sanding dry glue?
Sherwin Williams paint: The TLV for 2-butoxyethanol is 20 ppm and the PEL is 25 ppm. The sampling results range from 0.04 to 367 ppm so it is clear that different ways of applying this paint result in very different exposures and they can exceed the TLV and PEL. How can the results could be so wide?
3M Fastbond sealer: This is an old MSDS (1989) and doesn't follow the current ANSI 16-section format. Tell the class they may run into old MSDSs until 2015. The one sampling result for n-hexane is 0.3 parts per million, which is well below the OSHA PEL of 50, which is also the TLV. Point out that there is a formula to convert ppm to mg/m3 and vice versa.

Sikaflex sealant: Isocyanates are really powerful sensitizers; OSHA's PEL is 0.01 ppm as an 8-hour TWA; ACGIH TLV is 0.005 ppm as an 8-hour TWA. The measured amounts during application of a similar isocyanate were all below the limit of detection <0.001 to <0.002 ppm.
Durapax roofing pitch: The OSHA PEL and ACGIH TLV are both 0.2 mg/m3; the measured concentrations ranged from 0.14 to 1.93 mg/m3. The lower end of this range is under the standard, but the upper end is almost twice the standard. How could we keep the concentration down?

3. Is your product combustible? Flammable?

MinWax polyurethane: Combustible.
Loctite adhesive: Water-based and containing silica; not combustible or flammable.
Sherwin Williams paint: Not combustible or flammable. Closed containers may explode (due to the build-up of pressure) when exposed to extreme heat.
3M Fastbond sealer: Very flammable; has a flashpoint way below normal room temperature.
Sikaflex sealant: Combustible liquid
Durapax roofing pitch: OSHA Flammability Class is "undetermined" but flashpoint is 374 degrees F so it doesn't pose much risk

4. Are there additional chemicals that you are concerned about?

MinWax polyurethane: No, just mineral spirits
Loctite adhesive: No, just quartz
Sherwin Williams paint: Yes, titanium dioxide because it is 24% by weight and could be sprayed.
3M Fastbond sealer: Yes, Styrene-butadiene copolymer does not have an OSHA PEL, but could be checked on other sources to see if it poses any health risks.
Sikaflex sealant: Yes, xylene has a PEL of 100 and is 1-5% of the sealant. Ethylbenzene is <1% of product.
Durapax roofing pitch: No. Even though it is a mix of an estimated 4,500 chemicals, OSHA has a PEL for Coal Tar Pitch Volatiles.

Appendix C: OSHA Standard 1910.1200

Part Number:	1910
• Part Title:	Occupational Safety and Health Standards
• Subpart:	Z
• Subpart Title:	Toxic and Hazardous Substances
• Standard Number:	1910.1200
• Title:	Hazard Communication.
• Appendix:	A , B , C , D , E, F

1910.1200(a)
Purpose.

1910.1200(a)(1)
The purpose of this section is to ensure that the hazards of all chemicals produced or imported are classified, and that information concerning the classified hazards is transmitted to employers and employees. The requirements of this section are intended to be consistent with the provisions of the United Nations Globally Harmonized System of Classification and Labelling of Chemicals (GHS), Revision 3. The transmittal of information is to be accomplished by means of comprehensive hazard communication programs, which are to include container labeling and other forms of warning, safety data sheets and employee training.

1910.1200(a)(2)
This occupational safety and health standard is intended to address comprehensively the issue of classifying the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees, and to preempt any legislative or regulatory enactments of a state, or political subdivision of a state, pertaining to this subject. Classifying the potential hazards of chemicals and communicating information concerning hazards and appropriate protective measures to employees, may include, for example, but is not limited to, provisions for: developing and maintaining a written hazard communication program for the workplace, including lists of hazardous chemicals present; labeling of containers of chemicals in the workplace, as well as of containers of chemicals being shipped to other workplaces; preparation and distribution of safety data sheets to employees and downstream employers; and development and implementation of employee training programs regarding hazards of chemicals and protective measures. Under section 18 of the Act, no state or political subdivision of a state may adopt or enforce any requirement relating to the issue addressed by this Federal standard, except pursuant to a Federally-approved state plan.

1910.1200(b)
Scope and application.

1910.1200(b)(1)
This section requires chemical manufacturers or importers to classify the hazards of chemicals which they produce or import, and all employers to provide information to their employees about the hazardous chemicals to which they are exposed, by means of a hazard communication program, labels and other forms of warning, safety data sheets, and information and training. In addition, this section requires distributors to transmit the required information to employers. (Employers who do not produce or import chemicals need only focus on those parts of this rule that deal with establishing a workplace program and communicating information to their workers.)

1910.1200(b)(2)
This section applies to any chemical which is known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency.

1910.1200(b)(3)
This section applies to laboratories only as follows:

1910.1200(b)(3)(i)
Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced;

1910.1200(b)(3)(ii)
Employers shall maintain any safety data sheets that are received with incoming shipments of hazardous chemicals, and ensure that they are readily accessible during each workshift to laboratory employees when they are in their work areas;

1910.1200(b)(3)(iii)
Employers shall ensure that laboratory employees are provided information and training in accordance with paragraph (h) of this section, except for the location and availability of the written hazard communication program under paragraph (h)(2)(iii) of this section; and,

1910.1200(b)(3)(iv)
Laboratory employers that ship hazardous chemicals are considered to be either a chemical manufacturer or a distributor under this rule, and thus must ensure that any containers of hazardous chemicals leaving the laboratory are labeled in accordance with paragraph (f) of this section, and that a safety data sheet is provided to distributors and other employers in accordance with paragraphs (g)(6) and (g)(7) of this section.

1910.1200(b)(4)
In work operations where employees only handle chemicals in sealed containers which are not opened under normal conditions of use (such as are found in marine cargo handling, warehousing, or retail sales), this section applies to these operations only as follows:

1910.1200(b)(4)(i)
Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced;

1910.1200(b)(4)(ii)
Employers shall maintain copies of any safety data sheets that are received with incoming shipments of the sealed containers of hazardous chemicals, shall obtain a safety data sheet as soon as possible for sealed containers of hazardous chemicals received without a safety data sheet if an employee requests the safety data sheet, and shall ensure that the safety data sheets are readily accessible during each work shift to employees when they are in their work area(s); and,

1910.1200(b)(4)(iii)
Employers shall ensure that employees are provided with information and training in accordance with paragraph (h) of this section (except for the location and availability of the written hazard communication program under paragraph (h)(2)(iii) of this section), to the extent necessary to protect them in the event of a spill or leak of a hazardous chemical from a sealed container.

1910.1200(b)(5)
This section does not require labeling of the following chemicals:

1910.1200(b)(5)(i)
Any pesticide as such term is defined in the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 et seq.), when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Environmental Protection Agency;

1910.1200(b)(5)(ii)
Any chemical substance or mixture as such terms are defined in the Toxic Substances Control Act (15 U.S.C. 2601 et seq.), when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Environmental Protection Agency;

1910.1200(b)(5)(iii)
Any food, food additive, color additive, drug, cosmetic, or medical or veterinary device or product, including materials intended for use as ingredients in such products (e.g. flavors and fragrances), as such terms are defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.) or the Virus-Serum-Toxin Act of 1913 (21 U.S.C. 151 et seq.), and regulations issued under those Acts, when they are subject to the labeling requirements under those Acts by either the Food and Drug Administration or the Department of Agriculture;

1910.1200(b)(5)(iv)
Any distilled spirits (beverage alcohols), wine, or malt beverage intended for nonindustrial use, as such terms are defined in the Federal Alcohol Administration Act (27 U.S.C. 201 et seq.) and regulations issued under that Act, when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Bureau of Alcohol, Tobacco, Firearms and Explosives;

1910.1200(b)(5)(v)
Any consumer product or hazardous substance as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, when subject to a consumer product safety standard or labeling requirement of those Acts, or regulations issued under those Acts by the Consumer Product Safety Commission; and,

1910.1200(b)(5)(vi)
Agricultural or vegetable seed treated with pesticides and labeled in accordance with the Federal Seed Act (7 U.S.C. 1551 et seq.) and the labeling regulations issued under that Act by the Department of Agriculture.

1910.1200(b)(6)
This section does not apply to:

1910.1200(b)(6)(i)
Any hazardous waste as such term is defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6901 et seq.), when subject to regulations issued under that Act by the Environmental Protection Agency;

1910.1200(b)(6)(ii)
Any hazardous substance as such term is defined by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (42 U.S.C. 9601 et seq.) when the hazardous substance is the focus of remedial or removal action being conducted under CERCLA in accordance with Environmental Protection Agency regulations.

1910.1200(b)(6)(iii)
Tobacco or tobacco products;

1910.1200(b)(6)(iv)
Wood or wood products, including lumber which will not be processed, where the chemical manufacturer or importer can establish that the only hazard they pose to employees is the potential for flammability or combustibility (wood or wood products which have been treated with a hazardous chemical covered by this standard, and wood which may be subsequently sawed or cut, generating dust, are not exempted);

1910.1200(b)(6)(v)
Articles (as that term is defined in paragraph (c) of this section);

1910.1200(b)(6)(vi)
Food or alcoholic beverages which are sold, used, or prepared in a retail establishment (such as a grocery store, restaurant, or drinking place), and foods intended for personal consumption by employees while in the workplace;

1910.1200(b)(6)(vii)
Any drug, as that term is defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.), when it is in solid, final form for direct administration to the patient (e.g., tablets or pills); drugs which are packaged by the chemical manufacturer for sale to consumers in a retail establishment (e.g., over-the-counter drugs); and drugs intended for personal consumption by employees while in the workplace (e.g., first aid supplies);

1910.1200(b)(6)(viii)
Cosmetics which are packaged for sale to consumers in a retail establishment, and cosmetics intended for personal consumption by employees while in the workplace;

1910.1200(b)(6)(ix)
Any consumer product or hazardous substance, as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, where the employer can show that it is used in the workplace for the purpose intended by the chemical manufacturer or importer of the product, and the use results in a duration and frequency of exposure which is not greater than the range of exposures that could reasonably be experienced by consumers when used for the purpose intended;

1910.1200(b)(6)(x)
Nuisance particulates where the chemical manufacturer or importer can establish that they do not pose any physical or health hazard covered under this section;

1910.1200(b)(6)(xi)
Ionizing and nonionizing radiation; and,

1910.1200(b)(6)(xii)
Biological hazards.

1910.1200(c)
Definitions. Article means a manufactured item other than a fluid or particle: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical (as determined under paragraph (d) of this section), and does not pose a physical hazard or health risk to employees.

Assistant Secretary means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

Chemical means any substance, or mixture of substances.

Chemical manufacturer means an employer with a workplace where chemical(s) are produced for use or distribution.

Chemical name means the scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) rules of nomenclature, or a name that will clearly identify the chemical for the purpose of conducting a hazard classification.

Classification means to identify the relevant data regarding the hazards of a chemical; review those data to ascertain the hazards associated with the chemical; and decide whether the chemical will be classified as hazardous according to the definition of hazardous chemical in this section. In addition, classification for health and physical hazards includes the determination of the degree of hazard, where appropriate, by comparing the data with the criteria for health and physical hazards.

Commercial account means an arrangement whereby a retail distributor sells hazardous chemicals to an employer, generally in large quantities over time and/or at costs that are below the regular retail price.

Common name means any designation or identification such as code name, code number, trade name, brand name or generic name used to identify a chemical other than by its chemical name.

Container means any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical. For purposes of this section, pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle, are not considered to be containers.

Designated representative means any individual or organization to whom an employee gives written authorization to exercise such employee's rights under this section. A recognized or certified collective bargaining agent shall be treated automatically as a designated representative without regard to written employee authorization.

Director means the Director, National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designee.

Distributor means a business, other than a chemical manufacturer or importer, which supplies hazardous chemicals to other distributors or to employers.

Employee means a worker who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies. Workers such as office workers or bank tellers who encounter hazardous chemicals only in non-routine, isolated instances are not covered.

Employer means a person engaged in a business where chemicals are either used, distributed, or are produced for use or distribution, including a contractor or subcontractor.

Exposure or exposed means that an employee is subjected in the course of employment to a chemical that is a physical or health hazard, and includes potential (e.g. accidental or possible) exposure. "Subjected" in terms of health hazards includes any route of entry (e.g. inhalation, ingestion, skin contact or absorption.)

Foreseeable emergency means any potential occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which could result in an uncontrolled release of a hazardous chemical into the workplace.

Hazard category means the division of criteria within each hazard class, e.g., oral acute toxicity and flammable liquids include four hazard categories. These categories compare hazard severity within a hazard class and should not be taken as a comparison of hazard categories more generally.

Hazard class means the nature of the physical or health hazards, e.g., flammable solid, carcinogen, oral acute toxicity.

Hazard not otherwise classified (HNOC) means an adverse physical or health effect identified through evaluation of scientific evidence during the classification process that does not meet the specified criteria for the physical and health hazard classes addressed in this section. This does not extend coverage to adverse physical and health effects for which there is a hazard class addressed in this section, but the effect either falls below the cut-off value/concentration limit of the hazard class or is under a GHS hazard category that has not been adopted by OSHA (e.g., acute toxicity Category 5).

Hazard statement means a statement assigned to a hazard class and category that describes the nature of the hazard(s) of a chemical, including, where appropriate, the degree of hazard.

Hazardous chemical means any chemical which is classified as a physical hazard or a health hazard, a simple asphyxiant, combustible dust, pyrophoric gas, or hazard not otherwise classified.

Health hazard means a chemical which is classified as posing one of the following hazardous effects: acute toxicity (any route of exposure); skin corrosion or irritation; serious eye damage or eye irritation; respiratory or skin sensitization; germ cell mutagenicity; carcinogenicity; reproductive toxicity; specific target organ toxicity (single or repeated exposure); or aspiration hazard. The criteria for determining whether a chemical is classified as a health hazard are detailed in Appendix A to §1910.1200—Health Hazard Criteria.

Immediate use means that the hazardous chemical will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.

Importer means the first business with employees within the Customs Territory of the United States which receives hazardous chemicals produced in other countries for the purpose of supplying them to distributors or employers within the United States.

Label means an appropriate group of written, printed or graphic information elements concerning a hazardous chemical that is affixed to, printed on, or attached to the immediate container of a hazardous chemical, or to the outside packaging.

Label elements means the specified pictogram, hazard statement, signal word and precautionary statement for each hazard class and category.

Mixture means a combination or a solution composed of two or more substances in which they do not react.

Physical hazard means a chemical that is classified as posing one of the following hazardous effects: explosive; flammable (gases, aerosols, liquids, or solids); oxidizer (liquid, solid or gas); self-reactive; pyrophoric (liquid or solid); self-heating; organic peroxide; corrosive to metal; gas under pressure; or in contact with water emits flammable gas. See Appendix B to §1910.1200—Physical Hazard Criteria.

Pictogram means a composition that may include a symbol plus other graphic elements, such as a border, background pattern, or color, that is intended to convey specific information about the hazards of a chemical. Eight pictograms are designated under this standard for application to a hazard category.

Precautionary statement means a phrase that describes recommended measures that should be taken to minimize or prevent adverse effects resulting from exposure to a hazardous chemical, or improper storage or handling.

Produce means to manufacture, process, formulate, blend, extract, generate, emit, or repackage.

Product identifier means the name or number used for a hazardous chemical on a label or in the SDS. It provides a unique means by which the user can identify the chemical. The product identifier used shall permit cross-references to be made among the list of hazardous chemicals required in the written hazard communication program, the label and the SDS.

Pyrophoric gas means a chemical in a gaseous state that will ignite spontaneously in air at a temperature of 130 degrees F (54.4 degrees C) or below.

Responsible party means someone who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.

Safety data sheet (SDS) means written or printed material concerning a hazardous chemical that is prepared in accordance with paragraph (g) of this section.

Signal word means a word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label. The signal words used in this section are “danger” and “warning.” “Danger” is used for the more severe hazards, while “warning” is used for the less severe.

Simple asphyxiant means a substance or mixture that displaces oxygen in the ambient atmosphere, and can thus cause oxygen deprivation in those who are exposed, leading to unconsciousness and death.

Specific chemical identity means the chemical name, Chemical Abstracts Service (CAS) Registry Number, or any other information that reveals the precise chemical designation of the substance.

Substance means chemical elements and their compounds in the natural state or obtained by any production process, including any additive necessary to preserve the stability of the product and any impurities deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition.

Trade secret means any confidential formula, pattern, process, device, information or compilation of information that is used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it. Appendix E to §1910.1200—Definition of Trade Secret, sets out the criteria to be used in evaluating trade secrets.

Use means to package, handle, react, emit, extract, generate as a byproduct, or transfer.

Work area means a room or defined space in a workplace where hazardous chemicals are produced or used, and where employees are present.

Workplace means an establishment, job site, or project, at one geographical location containing one or more work areas.

1910.1200(d)
Hazard classification.

1910.1200(d)(1)
Chemical manufacturers and importers shall evaluate chemicals produced in their workplaces or imported by them to classify the chemicals in accordance with this section. For each chemical, the chemical manufacturer or importer shall determine the hazard classes, and, where appropriate, the category of each class that apply to the chemical being classified. Employers are not required to classify chemicals unless they choose not to rely on the classification performed by the chemical manufacturer or importer for the chemical to satisfy this requirement.

1910.1200(d)(2)
Chemical manufacturers, importers or employers classifying chemicals shall identify and consider the full range of available scientific literature and other evidence concerning the potential hazards. There is no requirement to test the chemical to determine how to classify its hazards. Appendix A to § 1910.1200 shall be consulted for classification of health hazards, and Appendix B to § 1910.1200 shall be consulted for the classification of physical hazards.

1910.1200(d)(3)
Mixtures.

1910.1200(d)(3)(i)
Chemical manufacturers, importers, or employers evaluating chemicals shall follow the procedures described in Appendices A and B to Sec. 1910.1200 to classify the hazards of the chemicals, including determinations regarding when mixtures of the classified chemicals are covered by this section.

1910.1200(d)(3)(ii)
When classifying mixtures they produce or import, chemical manufacturers and importers of mixtures may rely on the information provided on the current safety data sheets of the individualingredients, except where the chemical manufacturer or importer knows, or in the exercise of reasonable diligence should know, that the safety data sheet misstates or omits information required by this section.

1910.1200(e)
Written hazard communication program.

1910.1200(e)(1)
Employers shall develop, implement, and maintain at each workplace, a written hazard communication program which at least describes how the criteria specified in paragraphs (f), (g), and (h) of this section for labels and other forms of warning, safety data sheets, and employee information and training will be met, and which also includes the following:

1910.1200(e)(1)(i)
A list of the hazardous chemicals known to be present using a product identifier that is referenced on the appropriate safety data sheet (the list may be compiled for the workplace as a whole or for individual work areas); and,

1910.1200(e)(1)(ii)
The methods the employer will use to inform employees of the hazards of non-routine tasks (for example, the cleaning of reactor vessels), and the hazards associated with chemicals contained in unlabeled pipes in their work areas.

1910.1200(e)(2)
Multi-employer workplaces. Employers who produce, use, or store hazardous chemicals at a workplace in such a way that the employees of other employer(s) may be exposed (for example, employees of a construction contractor working on-site) shall additionally ensure that the hazard communication programs developed and implemented under this paragraph (e) include the following:

1910.1200(e)(2)(i)
The methods the employer will use to provide the other employer(s) on-site access to safety data sheets for each hazardous chemical the other employer(s)' employees may be exposed to while working;

1910.1200(e)(2)(ii)
The methods the employer will use to inform the other employer(s) of any precautionary measures that need to be taken to protect employees during the workplace's normal operating conditions and in foreseeable emergencies; and,

1910.1200(e)(2)(iii)
The methods the employer will use to inform the other employer(s) of the labeling system used in the workplace.

1910.1200(e)(3)
The employer may rely on an existing hazard communication program to comply with these requirements, provided that it meets the criteria established in this paragraph (e).

1910.1200(e)(4)
The employer shall make the written hazard communication program available, upon request, to employees, their designated representatives, the Assistant Secretary and the Director, in accordance with the requirements of 29 CFR 1910.1020 (e).

1910.1200(e)(5)
Where employees must travel between workplaces during a workshift, i.e., their work is carried out at more than one geographical location, the written hazard communication program may be kept at the primary workplace facility.

1910.1200(f)
Labels and other forms of warning—

1910.1200(f)(1)
Labels on shipped containers. The chemical manufacturer, importer, or distributor shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged, or marked. Hazards not otherwise classified do not have to be addressed on the container. Where the chemical manufacturer or importer is required to label, tag or mark the following information shall be provided:

1910.1200(f)(1)(i)
Product identifier;

1910.1200(f)(1)(ii)
Signal word;

1910.1200(f)(1)(iii)
Hazard statement(s);

1910.1200(f)(1)(iv)
Pictogram(s);

1910.1200(f)(1)(v)
Precautionary statement(s); and,

1910.1200(f)(1)(vi)
Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party.

1910.1200(f)(2)
The chemical manufacturer, importer, or distributor shall ensure that the information provided under paragraphs (f)(1)(i) through (v) of this section is in accordance with Appendix C to § 1910.1200, for each hazard class and associated hazard category for the hazardous chemical, prominently displayed, and in English (other languages may also be included if appropriate).

1910.1200(f)(3)
The chemical manufacturer, importer, or distributor shall ensure that the information provided under paragraphs (f)(1)(ii) through (iv) of this section is located together on the label, tag, or mark.

1910.1200(f)(4)
Solid materials.

1910.1200(f)(4)(i)
For solid metal (such as a steel beam or a metal casting), solid wood, or plastic items that are not exempted as articles due to their downstream use, or shipments of whole grain, the required label may be transmitted to the customer at the time of the initial shipment, and need not be included with subsequent shipments to the same employer unless the information on the label changes;

1910.1200(f)(4)(ii)
The label may be transmitted with the initial shipment itself, or with the safety data sheet that is to be provided prior to or at the time of the first shipment; and,

1910.1200(f)(4)(iii)
This exception to requiring labels on every container of hazardous chemicals is only for the solid material itself, and does not apply to hazardous chemicals used in conjunction with, or known to be present with, the material and to which employees handling the items in transit may be exposed (for example, cutting fluids or pesticides in grains).

1910.1200(f)(5)
Chemical manufacturers, importers, or distributors shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged, or marked in accordance with this section in a manner which does not conflict with the requirements of the Hazardous Materials Transportation Act (49 U.S.C. 1801 et seq.) and regulations issued under that Act by the Department of Transportation.

1910.1200(f)(6)
Workplace labeling. Except as provided in paragraphs (f)(7) and (f)(8) of this section, the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with either:

1910.1200(f)(6)(i)
The information specified under paragraphs (f)(1)(i) through (v) of this section for labels on shipped containers; or,

1910.1200(f)(6)(ii)
Product identifier and words, pictures, symbols, or combination thereof, which provide at least general information regarding the hazards of the chemicals, and which, in conjunction with the other information immediately available to employees under the hazard communication program, will provide employees with the specific information regarding the physical and health hazards of the hazardous chemical.

1910.1200(f)(7)
The employer may use signs, placards, process sheets, batch tickets, operating procedures, or other such written materials in lieu of affixing labels to individual stationary process containers, as long as the alternative method identifies the containers to which it is applicable and conveys the information required by paragraph (f)(6) of this section to be on a label. The employer shall ensure the written materials are readily accessible to the employees in their work area throughout each work shift.

1910.1200(f)(8)
The employer is not required to label portable containers into which hazardous chemicals are transferred from labeled containers, and which are intended only for the immediate use of the employee who performs the transfer. For purposes of this section, drugs which are dispensed by a pharmacy to a health care provider for direct administration to a patient are exempted from labeling.

1910.1200(f)(9)
The employer shall not remove or deface existing labels on incoming containers of hazardous chemicals, unless the container is immediately marked with the required information.

1910.1200(f)(10)
The employer shall ensure that workplace labels or other forms of warning are legible, in English, and prominently displayed on the container, or readily available in the work area throughout each work shift. Employers having employees who speak other languages may add the information in their language to the material presented, as long as the information is presented in English as well.

1910.1200(f)(11)
Chemical manufacturers, importers, distributors, or employers who become newly aware of any significant information regarding the hazards of a chemical shall revise the labels for the chemical within six months of becoming aware of the new information, and shall ensure that labels on containers of hazardous chemicals shipped after that time contain the new information. If the chemical is not currently produced or imported, the chemical manufacturer, importer, distributor, or employer shall add the information to the label before the chemical is shipped or introduced into the workplace again.

1910.1200(g)
Safety data sheets.

1910.1200(g)(1)
Chemical manufacturers and importers shall obtain or develop a safety data sheet for each hazardous chemical they produce or import. Employers shall have a safety data sheet in the workplace for each hazardous chemical which they use.

1910.1200(g)(2)
The chemical manufacturer or importer preparing the safety data sheet shall ensure that it is in English (although the employer may maintain copies in other languages as well), and includes at least the following section numbers and headings, and associated information under each heading, in the order listed (See Appendix D to § 1910.1200—Safety Data Sheets, for the specific content of each section of the safety data sheet):

1910.1200(g)(2)(i)
Section 1, Identification;

1910.1200(g)(2)(ii)
Section 2, Hazard(s) identification;

1910.1200(g)(2)(iii)
Section 3, Composition/information on ingredients;

1910.1200(g)(2)(iv)
Section 4, First-aid measures;

1910.1200(g)(2)(v)
Section 5, Fire-fighting measures;

1910.1200(g)(2)(vi)
Section 6, Accidental release measures;

1910.1200(g)(2)(vii)
Section 7, Handling and storage;

1910.1200(g)(2)(viii)
Section 8, Exposure controls/personal protection;

1910.1200(g)(2)(ix)
Section 9, Physical and chemical properties;

1910.1200(g)(2)(x)
Section 10, Stability and reactivity;

1910.1200(g)(2)(xi)
Section 11, Toxicological information;

1910.1200(g)(2)(xii)
Section 12, Ecological information;

1910.1200(g)(2)(xiii)
Section 13, Disposal considerations;

1910.1200(g)(2)(xiv)
Section 14, Transport information;

1910.1200(g)(2)(xv)
Section 15, Regulatory information; and

1910.1200(g)(2)(xvi)
Section 16, Other information, including date of preparation or last revision.

Note 1 to paragraph (g)(2): To be consistent with the GHS, an SDS must also include the headings in paragraphs (g)(2)(xii) through (g)(2)(xv) in order.

Note 2 to paragraph (g)(2): OSHA will not be enforcing information requirements in sections 12 through 15, as these areas are not under its jurisdiction.

1910.1200(g)(3)
If no relevant information is found for any sub-heading within a section on the safety data sheet, the chemical manufacturer, importer or employer preparing the safety data sheet shall mark it to indicate that no applicable information was found.

1910.1200(g)(4)
Where complex mixtures have similar hazards and contents (i.e. the chemical ingredients are essentially the same, but the specific composition varies from mixture to mixture), the chemical manufacturer, importer or employer may prepare one safety data sheet to apply to all of these similar mixtures.

1910.1200(g)(5)
The chemical manufacturer, importer or employer preparing the safety data sheet shall ensure that the information provided accurately reflects the scientific evidence used in making the hazard classification. If the chemical manufacturer, importer or employer preparing the safety data sheet becomes newly aware of any significant information regarding the hazards of a chemical, or ways to protect against the hazards, this new information shall be added to the safety data sheet within three months. If the chemical is not currently being produced or imported, the chemical manufacturer or importer shall add the information to the safety data sheet before the chemical is introduced into the workplace again.

1910.1200(g)(6)(i)
Chemical manufacturers or importers shall ensure that distributors and employers are provided an appropriate safety data sheet with their initial shipment, and with the first shipment after a safety data sheet is updated;

1910.1200(g)(6)(ii)
The chemical manufacturer or importer shall either provide safety data sheets with the shipped containers or send them to the distributor or employer prior to or at the time of the shipment;

1910.1200(g)(6)(iii)
If the safety data sheet is not provided with a shipment that has been labeled as a hazardous chemical, the distributor or employer shall obtain one from the chemical manufacturer or importer as soon as possible; and,

1910.1200(g)(6)(iv)
The chemical manufacturer or importer shall also provide distributors or employers with a safety data sheet upon request.

1910.1200(g)(7)(i)
Distributors shall ensure that safety data sheets, and updated information, are provided to other distributors and employers with their initial shipment and with the first shipment after a safety data sheet is updated;

1910.1200(g)(7)(ii)
The distributor shall either provide safety data sheets with the shipped containers, or send them to the other distributor or employer prior to or at the time of the shipment;

1910.1200(g)(7)(iii)
Retail distributors selling hazardous chemicals to employers having a commercial account shall provide a safety data sheet to such employers upon request, and shall post a sign or otherwise inform them that a safety data sheet is available;

1910.1200(g)(7)(iv)
Wholesale distributors selling hazardous chemicals to employers over-the-counter may also provide safety data sheets upon the request of the employer at the time of the over-the-counter purchase, and shall post a sign or otherwise inform such employers that a safety data sheet is available;

1910.1200(g)(7)(v)
If an employer without a commercial account purchases a hazardous chemical from a retail distributor not required to have safety data sheets on file (i.e., the retail distributor does not have commercial accounts and does not use the materials), the retail distributor shall provide the employer, upon request, with the name, address, and telephone number of the chemical manufacturer, importer, or distributor from which a safety data sheet can be obtained;

1910.1200(g)(7)(vi)
Wholesale distributors shall also provide safety data sheets to employers or other distributors upon request; and,

1910.1200(g)(7)(vii)
Chemical manufacturers, importers, and distributors need not provide safety data sheets to retail distributors that have informed them that the retail distributor does not sell the product to commercial accounts or open the sealed container to use it in their own workplaces.

1910.1200(g)(8)
The employer shall maintain in the workplace copies of the required safety data sheets for each hazardous chemical, and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s). (Electronic access and other alternatives to maintaining paper copies of the safety data sheets are permitted as long as no barriers to immediate employee access in each workplace are created by such options.)

1910.1200(g)(9)

Where employees must travel between workplaces during a workshift, i.e., their work is carried out at more than one geographical location, the material safety data sheets may be kept at the primary workplace facility. In this situation, the employer shall ensure that employees can immediately obtain the required information in an emergency.

1910.1200(g)(10)
Safety data sheets may be kept in any form, including operating procedures, and may be designed to cover groups of hazardous chemicals in a work area where it may be more appropriate to address the hazards of a process rather than individual hazardous chemicals. However, the employer shall ensure that in all cases the required information is provided for each hazardous chemical, and is readily accessible during each work shift to employees when they are in their work area(s).

1910.1200(g)(11)
Safety data sheets shall also be made readily available, upon request, to designated representatives, the Assistant Secretary, and the Director, in accordance with the requirements of § 1910.1020(e).

1910.1200(h)
Employee information and training.

1910.1200(h)(1)
Employers shall provide employees with effective information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new chemical hazard the employees have not previously been trained about is introduced into their work area. Information and training may be designed to cover categories of hazards (e.g., flammability, carcinogenicity) or specific chemicals. Chemical-specific information must always be available through labels and safety data sheets.

1910.1200(h)(2)
Information. Employees shall be informed of:

1910.1200(h)(2)(i)
The requirements of this section;

1910.1200(h)(2)(ii)
Any operations in their work area where hazardous chemicals are present; and,

1910.1200(h)(2)(iii)
The location and availability of the written hazard communication program, including the required list(s) of hazardous chemicals, and safety data sheets required by this section.

1910.1200(h)(3)
Training. Employee training shall include at least:

1910.1200(h)(3)(i)
Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);

1910.1200(h)(3)(ii)
The physical, health, simple asphyxiation, combustible dust, and pyrophoric gas hazards, as well as hazards not otherwise classified, of the chemicals in the work area;

1910.1200(h)(3)(iii)
The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used; and,

1910.1200(h)(3)(iv)
The details of the hazard communication program developed by the employer, including an explanation of the labels received on shipped containers and the workplace labeling system used by their employer; the safety data sheet, including the order of information and how employees can obtain and use the appropriate hazard information.

1910.1200(i)
Trade secrets.

1910.1200(i)(1)
The chemical manufacturer, importer, or employer may withhold the specific chemical identity, including the chemical name, other specific identification of a hazardous chemical, or the exact percentage (concentration) of the substance in a mixture, from the safety data sheet, provided that:

1910.1200(i)(1)(i)
The claim that the information withheld is a trade secret can be supported;

1910.1200(i)(1)(ii)
Information contained in the safety data sheet concerning the properties and effects of the hazardous chemical is disclosed;

1910.1200(i)(1)(iii)
The safety data sheet indicates that the specific chemical identity and/or percentage of composition is being withheld as a trade secret; and,

1910.1200(i)(1)(iv)
The specific chemical identity and percentage is made available to health professionals, employees, and designated representatives in accordance with the applicable provisions of this paragraph (i).

1910.1200(i)(2)
Where a treating physician or nurse determines that a medical emergency exists and the specific chemical identity and/or specific percentage of composition of a hazardous chemical is necessary for emergency or first-aid treatment, the chemical manufacturer, importer, or employer shall immediately disclose the specific chemical identity or percentage composition of a trade secret chemical to that treating physician or nurse, regardless of the existence of a written statement of need or a confidentiality agreement. The chemical manufacturer, importer, or employer may require a written statement of need and confidentiality agreement, in accordance with the provisions of paragraphs (i)(3) and (4) of this section, as soon as circumstances permit.

1910.1200(i)(3)
In non-emergency situations, a chemical manufacturer, importer, or employer shall, upon request, disclose a specific chemical identity or percentage composition, otherwise permitted to be withheld under paragraph (i)(1) of this section, to a health professional (i.e. physician, industrial hygienist, toxicologist, epidemiologist, or occupational health nurse) providing medical or other occupational health services to exposed employee(s), and to employees or designated representatives, if:

1910.1200(i)(3)(i)
The request is in writing;

1910.1200(i)(3)(ii)
The request describes with reasonable detail one or more of the following occupational health needs for the information:

1910.1200(i)(3)(ii)(A)
To assess the hazards of the chemicals to which employees will be exposed;

1910.1200(i)(3)(ii)(B)
To conduct or assess sampling of the workplace atmosphere to determine employee exposure levels;

1910.1200(i)(3)(ii)(C)
To conduct pre-assignment or periodic medical surveillance of exposed employees;

1910.1200(i)(3)(ii)(D)
To provide medical treatment to exposed employees;

1910.1200(i)(3)(ii)(E)
To select or assess appropriate personal protective equipment for exposed employees;

1910.1200(i)(3)(ii)(F)
To design or assess engineering controls or other protective measures for exposed employees; and,

1910.1200(i)(3)(ii)(G)
To conduct studies to determine the health effects of exposure.

1910.1200(i)(3)(iii)
The request explains in detail why the disclosure of the specific chemical identity or percentage composition is essential and that, in lieu thereof, the disclosure of the following information to the health professional, employee, or designated representative, would not satisfy the purposes described in paragraph (i)(3)(ii) of this section:

1910.1200(i)(3)(iii)(A)
The properties and effects of the chemical;

1910.1200(i)(3)(iii)(B)
Measures for controlling workers' exposure to the chemical;

1910.1200(i)(3)(iii)(C)
Methods of monitoring and analyzing worker exposure to the chemical; and,

1910.1200(i)(3)(iii)(D)
Methods of diagnosing and treating harmful exposures to the chemical;

1910.1200(i)(3)(iv)
The request includes a description of the procedures to be used to maintain the confidentiality of the disclosed information; and,

1910.1200(i)(3)(v)
The health professional, and the employer or contractor of the services of the health professional (i.e. downstream employer, labor organization, or individual employee), employee, or designated representative, agree in a written confidentiality agreement that the health professional, employee, or designated representative, will not use the trade secret information for any purpose other than the health need(s) asserted and agree not to release the information under any circumstances other than to OSHA, as provided in paragraph (i)(6) of this section, except as authorized by the terms of the agreement or by the chemical manufacturer, importer, or employer.

1910.1200(i)(4)
The confidentiality agreement authorized by paragraph (i)(3)(iv) of this section:

1910.1200(i)(4)(i)
May restrict the use of the information to the health purposes indicated in the written statement of need;

1910.1200(i)(4)(ii)
May provide for appropriate legal remedies in the event of a breach of the agreement, including stipulation of a reasonable pre-estimate of likely damages; and,

1910.1200(i)(4)(iii)
May not include requirements for the posting of a penalty bond.

1910.1200(i)(5)
Nothing in this standard is meant to preclude the parties from pursuing non-contractual remedies to the extent permitted by law.

1910.1200(i)(6)
If the health professional, employee, or designated representative receiving the trade secret information decides that there is a need to disclose it to OSHA, the chemical manufacturer, importer, or employer who provided the information shall be informed by the health professional, employee, or designated representative prior to, or at the same time as, such disclosure.

1910.1200(i)(7)
If the chemical manufacturer, importer, or employer denies a written request for disclosure of a specific chemical identity or percentage composition, the denial must:

1910.1200(i)(7)(i)
Be provided to the health professional, employee, or designated representative, within thirty days of the request;

1910.1200(i)(7)(ii)
Be in writing;

1910.1200(i)(7)(iii)
Include evidence to support the claim that the specific chemical identity or percent of composition is a trade secret;

1910.1200(i)(7)(iv)
State the specific reasons why the request is being denied; and,

1910.1200(i)(7)(v)
Explain in detail how alternative information may satisfy the specific medical or occupational health need without revealing the trade secret.

1910.1200(i)(8)
The health professional, employee, or designated representative whose request for information is denied under paragraph (i)(3) of this section may refer the request and the written denial of the request to OSHA for consideration.

1910.1200(i)(9)
When a health professional, employee, or designated representative refers the denial to OSHA under paragraph (i)(8) of this section, OSHA shall consider the evidence to determine if:

1910.1200(i)(9)(i)
The chemical manufacturer, importer, or employer has supported the claim that the specific chemical identity or percentage composition is a trade secret;

1910.1200(i)(9)(ii)
The health professional, employee, or designated representative has supported the claim that there is a medical or occupational health need for the information; and,

1910.1200(i)(9)(iii)
The health professional, employee or designated representative has demonstrated adequate means to protect the confidentiality.

1910.1200(i)(10)(i)
If OSHA determines that the specific chemical identity or percentage composition requested under paragraph (i)(3) of this section is not a "bona fide" trade secret, or that it is a trade secret, but the requesting health professional, employee, or designated representative has a legitimate medical or occupational health need for the information, has executed a written confidentiality agreement, and has shown adequate means to protect the confidentiality of the information, the chemical manufacturer, importer, or employer will be subject to citation by OSHA.

1910.1200(i)(10)(ii)
If a chemical manufacturer, importer, or employer demonstrates to OSHA that the execution of a confidentiality agreement would not provide sufficient protection against the potential harm from the unauthorized disclosure of a trade secret, the Assistant Secretary may issue such orders or impose such additional limitations or conditions upon the disclosure of the requested chemical information as may be appropriate to assure that the occupational health services are provided without an undue risk of harm to the chemical manufacturer, importer, or employer.

1910.1200(i)(11)
If a citation for a failure to release trade secret information is contested by the chemical manufacturer, importer, or employer, the matter will be adjudicated before the Occupational Safety and Health Review Commission in accordance with the Act's enforcement scheme and the applicable Commission rules of procedure. In accordance with the Commission rules, when a chemical manufacturer, importer, or employer continues to withhold the information during the contest, the Administrative Law Judge may review the citation and supporting documentation "in camera" or issue appropriate orders to protect the confidentiality of such matters.

1910.1200(i)(12)
Notwithstanding the existence of a trade secret claim, a chemical manufacturer, importer, or employer shall, upon request, disclose to the Assistant Secretary any information which this section requires the chemical manufacturer, importer, or employer to make available. Where there is a trade secret claim, such claim shall be made no later than at the time the information is provided to the Assistant Secretary so that suitable determinations of trade secret status can be made and the necessary protections can be implemented.

1910.1200(i)(13)
Nothing in this paragraph shall be construed as requiring the disclosure under any circumstances of process information which is a trade secret.

1910.1200(j)
Effective dates.

1910.1200(j)(1)
Employers shall train employees regarding the new label elements and safety data sheets format by December 1, 2013.

1910.1200(j)(2)
Chemical manufacturers, importers, distributors, and employers shall be in compliance with all modified provisions of this section no later than June 1, 2015, except:

1910.1200(j)(2)(i)
After December 1, 2015, the distributor shall not ship containers labeled by the chemical manufacturer or importer unless the label has been modified to comply with paragraph (f)(1) of this section.

1910.1200(j)(2)(ii)
All employers shall, as necessary, update any alternative workplace labeling used under paragraph (f)(6) of this section, update the hazard communication program required by paragraph (h)(1), and provide any additional employee training in accordance with paragraph (h)(3) for newly identified physical or health hazards no later than June 1, 2016.

1910.1200(j)(3)
Chemical manufacturers, importers, distributors, and employers may comply with either § 1910.1200 revised as of October 1, 2011, or the current version of this standard, or both during the transition period.

59 FR 17479, April 13, 1994; 59 FR 65947, Dec. 22, 1994; 61 FR 5507, Feb. 13, 1996; 77 FR 17785, March 26, 2012]

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