OSHA
29 CFR 1910.1200
(HCS-2012)

&

United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS, Rev 3)
**Intent** - To provide employees with information to help them make knowledgeable decisions about chemical hazards in their workplace
• Written program for each location to cover issues of chemical safety and hazard communication (HAZCOMM)

• Labels to identify each chemical

• Material Safety Data Sheets (MSDSs) (now SDSs under the Globally Harmonized System: GHS)

• Safe work procedures/practices

• Employee training on SDS information and safe chemical procedures and practices
Training

- Upon initial employment
- When a new hazardous product/chemical is introduced into the workplace
- Change in process
- As deemed necessary by supervision/management
“Right to Know” Law

• Ensures all employees’ right to know the hazards of chemicals they work with at their job

• Mandates that employees must be provided with information about chemicals they work with through:
  - Information on chemical labels
  - Safety Data Sheets (SDSs)
  - Training on hazard communication
  - Written HAZCOMM plan
Why is a Standard Necessary?

• To evaluate the hazards of all chemicals imported into, produced, or used in workplaces in the United States

• To prevent or minimize employee exposure to chemicals

• Because chemical exposure can contribute to serious health effects:
  
  o Heart ailments
  o Burns/rashes
  o Kidney/lung damage
  o Sterility
  o Cancer
  o Central nervous system damage
“Globally Harmonized System” created by the United Nations

Also known as “GHS”

A system for standardizing chemical classification and labeling for world-wide implementation

Labels:
- Signal words (Danger/Warning)
- Hazard statements
- Precautionary statements
- Pictograms (9)

SDS-16 categories

Training
Rationale:
“To provide a single, harmonized system to classify chemicals, labels and SDS with the primary benefit of increasing the quality and consistency of information provided to workers, employers and chemical users”*

Effective, in part, on June 26, 2012, with a built-in transition period and a fully effective date of June 1, 2016

• The adoption of this will affect the OSHA 29 CFR 1910.1200 Hazard Communication Standard with changes

• GHS is updated every two years

• Hazard Communication Standard, (HCS), to remain current, can be updated by:
  o Technical updates (minor terminology changes),
  o Direct final rules (for text clarification), and
  o Notice and comment rulemaking (for more substantive updates or changes)
OSHA HazComm Modifications due to GHS

- Hazard classification of chemical hazards
- Revised labeling provisions that include requirements for:
  - Standardized signal words
  - Pictograms
  - Hazard statements
  - Precautionary statements
- Specified format for safety data sheets in 16 section format and
- Revisions to definitions of terms used in the standard and requirements for employee training on labels and Safety Data Sheets (SDS)
HCS Key Revisions also Include

- Disclosure of PELs and voluntary threshold limit values (TLVs) established by the American Conference of Governmental Industrial Hygienists (ACGIH)
- Disclosure of carcinogen status from nationally and internationally recognized lists of carcinogens
- Inclusion of combustible dust in the definition of “hazardous chemical” covered on labels and SDS
- Workers be re-trained within 2 years of the publication of the final rule
- Mixtures (GHS)
  - Health hazards can be based on data for mixture
  - If no data, extrapolate from ingredient data or other similar mixtures to classify
• Creation of a new category of hazards – “Hazards Not Otherwise Classified” (HNOC)

• OSHA originally classified this category

• HNOC (HCS) disclosed on SDS in section 2, not label

• Under new GHS standard, the following are not classified under HNOC but addressed individually:
  - Pyrophoric gases
  - Simple asphyxiants
  - Combustible dusts

• GHS label elements for combustible dusts:
  - Signal Word: Warning
  - Hazard Statement: “May form combustible dust concentrations in the air”
OSHA label elements for:

Pyrophoric Gases:
- **Signal Word**: Danger
- **Hazard Statement**: “Catches fire spontaneously if exposed to air”

Simple Asphyxiants:
- **Signal Word**: Warning
- **Hazard Statement**: “May displace oxygen and cause rapid suffocation”

Combustible Dusts:
- **Signal Word**: Warning
- **Hazard Statement**: “May form combustible dust concentrations in the air”
OSHA will Also Revise

Standards dealing with:

• Flammable and combustible liquids
• Process safety management
• Most substance-specific health standards

OSHA’s Process Safety Management
## Effective Dates for GHS

<table>
<thead>
<tr>
<th>Effective Completion Date</th>
<th>Requirements</th>
<th>Who</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec. 1, 2013</td>
<td>Train employees on the new label elements and Safety Data Sheet (SDS) format</td>
<td>Employers</td>
</tr>
<tr>
<td>June 1, 2015</td>
<td>Compliance with all modified provisions of this final rule, except:</td>
<td>Chemical manufacturers, importers, distributors and employers</td>
</tr>
<tr>
<td>Dec. 1, 2015</td>
<td>The distributor may ship products labeled by manufacturers under the old system until December 1, 2015</td>
<td></td>
</tr>
</tbody>
</table>
## Effective Dates

<table>
<thead>
<tr>
<th>Effective Completion Date</th>
<th>Requirements</th>
<th>Who</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 1, 2016</td>
<td>Update alternative workplace labeling and hazard communication program as necessary, and provide additional employee training for newly-identified physical or health hazards</td>
<td>Employers</td>
</tr>
<tr>
<td>Transition period to the effective completion dates noted above</td>
<td>May comply with either 29 CFR 1910.1200 Hazard Communication (final standard), current standard, or both</td>
<td>Chemical manufacturers, distributors, and employers</td>
</tr>
</tbody>
</table>
OSHA proposed all revisions of the Hazard Communication Standard (HCS) become effective by June 1, 2016
• GHS has specific criteria for each health and physical hazard

• Detailed instructions for hazard evaluation and determinations whether mixtures of the substance are covered

• A and B (mandatory): Classification guidance for health hazards and physical hazards

• Test-method neutral (person classifying a chemical or substance should use available data and no additional testing is required to classify a chemical)
GHS: Only terminology changes

GHS has no provisions regarding Hazard Communication programs
Chemicals are all around us every day

Chemicals can be:

- Corrosive
- Reactive
- Flammable
- Explosive
- Oxidizing
- Inert
In many cases, the chemicals you may deal with at work are no more dangerous than those you use at home.

But in the workplace exposure may be greater, concentrations higher, exposure time longer: potential danger could be greater on the job.
Inhalation - nearly all materials that are airborne can be inhaled

Skin Absorption - skin contact with a substance can result in a possible reaction

Ingestion - most workers do not deliberately swallow materials they handle

Injection – normally associated with bloodborne pathogens

Ocular - absorbed through the eyes
A chemical can pose a “physical hazard” or a “health hazard”

The hazard communication standard applies to both types of hazards

GHS looks at:

- Class-nature of hazard
- Category-degree of severity
Physical hazards are exhibited by certain chemicals because of their physical properties (e.g. flammability, reactivity, etc.)

These chemicals fall into the following classes:

- Flammable liquids or solids
- Combustible liquids
- Compressed gases
- Explosives
Physical Hazards

- **Organic peroxide**: May react explosively to temperature/pressure changes

- **Oxidizers**: Chemicals that initiate or promote combustion in other materials

- **Pyrophoric materials**: May ignite spontaneously in air temperatures of 130ºF or below

- **Unstable materials**

- **Water reactive materials**
Health hazard - Occurs when a chemical produces an acute or chronic health effect on exposed employees
Acute Health Effects

• Happen quickly

• High, brief exposure

• Examples:
  o Carbon monoxide poisoning
  o Cyanide inhalation
  o Hydrogen sulfide inhalation
Chronic Health Effects

• May be caused by chemical exposures that do not cause immediate, obvious harm or make you feel sick right away

• May not see, feel, or smell the danger

• Effects are long, continuous and follow repeated long-term exposure; e.g.:
  o Lung cancer from cigarette smoking
  o Black lung from coal mine dust
• Corrosives, solvents and other chemical substances can be potentially dangerous

• Safe handling procedures
  o Read container labels
  o Check SDS(s)

• Never sniff a chemical for identification

• Use appropriate personal protective equipment
Example of one type of labeling system used
• Each container must be labeled, tagged or marked

• Warning can be a message, words, pictures or symbols

• Labels must be written in English and prominently displayed
Chemical manufacturers and importers must provide a label that includes:

- Harmonized signal word
- Pictogram
- Hazard statement for each hazard class and category
- Precautionary statements must also be provided as well as product identifier and supplier information
Warning labels provide important information about the chemical:

- **DANGER**
- **WARNING**

Always read the label *before* you begin a job using a potentially hazardous chemical.
• Mandatory Appendix C: What specific information is to be provided for each hazard class and category once a chemical is classified

• Requirements are significantly different from existing HCS

• GHS uses nine pictograms to convey health, physical and environmental hazards

• Proposed HCS requires eight of these pictograms (no environmental hazard since environmental is not within OSHA’s jurisdiction)
Employers who only store chemicals may either use OSHA’s new labeling system or continue using the NFPA 704 rating system or HMIS system.

(OSHA plans to change the labeling system June 1, 2016)
GHS classification ratings order of severity differ from NFPA and HMIS:

**HMIS/NFPA**
- 0 = Least Hazardous
- 4 = Most Hazardous

**GHS**
- 5 = Least Hazardous
- 1 = Most Hazardous
Different symbol on white background with red square frame set on point

Eight pictograms are required by OSHA

The ninth one dealing with the environment is not within OSHA’s jurisdiction
Health Hazard

Used to describe:
- Carcinogen
- Mutagenicity
- Reproductive toxicity
- Respiratory sensitizer
- Target organ toxicity
- Aspiration toxicity
- Germ cell mutagens
Flame

Describes:
- Flammables
- Pyrophorics
- Self-heating
- Emits flammable gas
- Self-reactives
- Organic peroxides
Describes:

- Irritant (skin and eye)
- Skin sensitizer
- Acute toxicity (harmful)
- Narcotic effects
- Respiratory tract irritant
- Hazardous to ozone layer (non-mandatory)
Describes:

- Gases under pressure
Describes:

- Skin corrosion/burns
- Eye damage
- Corrosive to metals
Exploding Bomb

Describes:

- Explosives
- Self-reactives
- Organic peroxide
Describes:

- Oxidizers

Anything wrong with this picture?

Yes!

Unsafe storage – cylinders falling over!
Describes:

- Acute toxicity (fatal or toxic)
A single word indicating relative hazard severity

“Danger” for more severe hazards,

“Warning” for less severe hazards
• Assigned to hazard class and category,
• Nature of hazard of a chemical, and
• Degree of hazard

“Statements” are alphanumeric codes

Example: H221 (means flammable gas)
H= That this is a hazard statement
2= physical hazard
3= health hazard
4= environmental hazard
“21” in this code is specific to the hazard
Precautionary Statement

• Measures to minimize/prevent adverse effects from exposure, improper storage, or handling
• Also an alphanumeric code

Example: P373

P = that this is a precautionary statement
1 = general precaution
2 = prevention precaution
3 = response precaution
4 = storage precaution
5 = disposal precaution
P373 = “Don’t fight fire when fire reaches explosives”
Information required on a GHS label:

1-Product identifier
2-Pictograms
3-Signal word
4-Hazard statement
5-Precautionary statement
6-Supplier information
## Classification and Labeling Summary Tables

### A2.1 Explosives

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Criteria</th>
<th>Hazard Communication Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unstable Explosives</td>
<td>According to the results of the test in Part 1 of the Manual of Tests and Criteria ... Transport of Dangerous Goods</td>
<td>Symbol</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Signal Word</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hazard Statement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unstable Explosives</td>
</tr>
</tbody>
</table>
Classification and Labeling Summary
Tables
A2.6 Flammable Liquids

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Criteria</th>
<th>Hazard Communication Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flash point $&lt;23^\circ$C and initial boiling point $\leq35^\circ$C</td>
<td>Symbol</td>
</tr>
</tbody>
</table>

Signal Word | Danger  
---|---
Hazard Statement | Extremely Flammable Liquid & Vapor
## Table A3.1.2 Hazard Statement Codes

Hazard Statement Codes for Health Hazards (Examples)

<table>
<thead>
<tr>
<th>Code</th>
<th>Health Hazard</th>
<th>Hazard Class</th>
<th>Hazard Cat.</th>
</tr>
</thead>
<tbody>
<tr>
<td>H301</td>
<td>Toxic if swallowed</td>
<td>Acute Toxicity, oral</td>
<td>3</td>
</tr>
<tr>
<td>H331</td>
<td>Toxic if inhaled</td>
<td>Acute Toxicity, inhalation</td>
<td>3</td>
</tr>
<tr>
<td>H311</td>
<td>Toxic in contact with skin</td>
<td>Acute Toxicity, dermal</td>
<td>3</td>
</tr>
</tbody>
</table>
### Codification of Response Precautionary Statements (Examples)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>P301</td>
<td>If swallowed</td>
<td>Acute Toxicity, oral</td>
<td>1, 2, 3, 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Skin corrosion</td>
<td>1A, 1B, 1C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aspiration hazard</td>
<td>1, 2</td>
</tr>
<tr>
<td>P330</td>
<td>Rinse mouth</td>
<td>Acute Toxicity, oral</td>
<td>1, 2, 3, 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Skin corrosion</td>
<td>1A, 1B, 1C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aspiration hazard</td>
<td>1, 2</td>
</tr>
<tr>
<td>P331</td>
<td>Do NOT induce vomiting</td>
<td>Skin corrosion</td>
<td>1A, 1B, 1C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aspiration hazard</td>
<td>1, 2</td>
</tr>
</tbody>
</table>
Labels

Chemical manufacturer, importer or distributor: ensure each container of hazardous chemicals leaving workplace is labeled, tagged or marked with:

- Identity of chemical,
- Hazard warnings, and
- Name and address of manufacturer, distributor or importer
For transportation: Use pictograms, referred to as labels in transport regulations, prescribed by UN Model Regulations on the Transport of Dangerous Goods
**UN regulations:**

This symbol affixed to packaging on a background of contrasting color.

Only UN transport markings and labels are required for outer packaging.
Label Examples

On containers

On shipping boxes
“Hazard Identification Numbers” may be used with intermodal containers

**Top panel:** 2 or 3 digits coded to group of hazards;

**Bottom panel:** these numbers can be searched in the Emergency Response Guidebook
• Under the GHS, MSDSs (material safety data sheets) become SDS (safety data sheets)

• Categories (16) to be listed in a specific order

• Adheres to ANSI standard Z400.1

• GHS requires new SDSs be in uniform format by June 1, 2015

• Information for mixtures not individual chemicals in a mixture
- Safety Data Sheet
- Developed by chemical manufacturers and importers
- An SDS must be on hand for each hazardous chemical used
- SDS for mixtures not individual chemicals in the mixtures
Information on a SDS

• Chemical names

• Manufacturer info (name, address and telephone numbers)

• List of chemical ingredients

• Permissible exposure limits (PELs) and threshold limit values (TLVs)
Any other exposure limit used or recommended by chemical manufacturer, importer or employer preparing the SDSs now are required on the SDS
Information on a SDS

• Reactions with other chemicals

• Physical appearance

• Date of preparation

• Plus:
  o How to put out a fire caused by a chemical
  o How to handle spills
  o How to prevent dangerous exposures
Where are your SDSs?

SDSs:

• Must be readily accessible to employees during their work shift

• Are typically kept in a centralized location

• Must be updated as new information becomes available
Section 1: Identification
Section 2: Hazard identification
Section 3: Ingredients
Section 4: First-aid measures
Section 5: Fire fighting measure
Section 6: Accidental release measures
Section 7: Handling and storage
Section 8: Exposure controls and personal protection
Section 9: Physical and chemical properties
Section 10: Stability and reactivity
Section 11: Toxicological information
Section 12: Ecological information*
Section 13: Disposal considerations*
Section 14: Transport information*
Section 15: Regulatory information*
Section 16: Other information

* OSHA indicated that since other agencies regulate sections 12-15, OSHA will not be enforcing them
Section 1: Identification

- Product identifier used on label
- Other means of identification
- Recommended use of chemical and restrictions on use
- Name, address, telephone number of manufacturer, importer or other responsible party
- Emergency phone number
Section 2: Hazard Identification

• Instead of hazard determination, employer must classify a hazardous chemical according to changed conditions provided in Appendices A and B
• Pictograms are a new requirement
• Standardized hazard statements
• Signal words
• Precautionary statements are now required
• SDS required for each mixture rather than one for each chemical comprising a mixture
• If one study in 10 indicates material is carcinogenic, but others don’t, must list the one carcinogenic study
Section 2: Hazard Identification

• Classification of chemical
• Signal word, hazard statement(s), symbol(s) and precautionary statement(s) in accordance with paragraph (f) of this section (hazard symbols may be provided as graphical reproductions or the name of the symbol, e.g. flame, skull and crossbones)
• Unclassified hazards (e.g., combustible dust or dust explosion hazard)
• Where an ingredient with unknown acute toxicity is used in a mixture at a concentration \( \geq 1 \) percent, a statement that \( x \) percent of mixture consists of ingredient(s) of unknown toxicity is required
No new requirements other than:

• Format

• A separate SDS will be required for each mixture rather than one for each chemical comprising the mixture
Section 3: Composition

Except as provided in (i) this section on trade secrets

For Substances

• Chemical name
• Common name and synonyms
• CAS number and other unique identifiers
• Impurities and stabilizing additives which are themselves classified and which contribute to the classification of the substance
Section 3: Composition

- The chemical name and concentration or concentration ranges of all ingredients, which are classified as health hazards in accordance with (d) this section.

- For all chemicals where a trade secret is claimed, Trade Secret per (i) this section, a statement that the specific chemical identity and/or percent of composition has been withheld as a trade secret is required.
Section 4: First Aid

• No new requirements other than format

• Description of necessary measures, subdivided according to the different routes of exposure, i.e. inhalation, skin and eye contact, ingestion

• Most important symptoms/effects, acute and delayed

• Indication of immediate medical attention and special treatment needed, if necessary
Section 5: Fire-fighting

No new requirements other than format

• Suitable (and unsuitable) extinguishing media
• Specific hazards arising from the chemical (e.g. nature of any hazardous combustion products)
• Special protective equipment and precautions for firefighters
Section 6: Accidental Release

- No new requirements other than format
- Personal precautions, protective equipment, emergency procedures
- Methods and materials for containment and clean up
Section 7: Handling & Storage

- No new requirements other than format
- Precautions for safe handling
- Conditions for safe storage, including any incompatibilities

Cylinders unchained; Drum not labeled properly; No spill containment for drum; Materials may be incompatible

Is this safe storage? NO!
No new requirements other than format

- OSHA PEL (permissible exposure limit) and any other exposure limit used or recommended by the chemical manufacturer, importer or employer preparing the SDS
- Appropriate engineering controls
- Individual protection measures, such as PPE
Section 9: Physical, Chemical Properties

No new requirements other than format:

- Appearance (physical state, color, etc)
- Odor
- pH
- Melting point/freezing point
- Initial boiling point and boiling range
- Flash point

- Evaporation rate
- Flammability (solid, liquid, gas)
- Upper/lower flammability or explosive limits
- Vapor pressure
- Vapor density
- Relative density
- Solubility
Section 9: Physical, Chemical Properties

- Partition coefficient: n-octanol/water
- Auto-ignition temperature
- Decomposition temperature
- Viscosity
Section 10: Stability and Reactivity

• Conditions to avoid
• New to HCS (as has been required in ANSI Z400.1 standard)
• Reactivity
• Chemical stability
• Possibility of hazardous reactions

• Conditions to avoid (static discharge, shock or vibration)
• Incompatible materials
• Hazardous decomposition products
No new requirements other than format:

• Description of various toxicological effects and available data used to identify those effects, including:
  o Likely exposure routes (inhalation, ingestion, skin and eye contact)
  o Symptoms related to the physical, chemical and toxicological characteristics
  o Delayed and immediate effects and chronic effects from short and long term exposure
  o Numerical measures of toxicity (such as acute toxicity estimates)
Non-mandatory

• To be GHS-compliant, the requirements for this section would be:
  o Ecotoxicity (aquatic and terrestrial, where available)
  o Persistence and degradability
  o Bioaccumulative potential
  o Mobility in soil
  o Other adverse effects
Section 13: Disposal Considerations

• To be GHS compliant, this section is provided, but compliance is outside OSHA jurisdiction
• However, OSHA may enforce provisions associated with safe handling and use, including appropriate hygienic practices (see Section 7, above)
• Description of waste residues and information on their safe handling
• Methods of disposal
• Disposal of any contaminated packaging
Section 14: Transportation Information

• To be GHS compliant, this section is provided, but compliance is outside OSHA jurisdiction.

• UN number

• UN proper shipping name

• Transport hazard classes

• Packing group, if applicable

• Environmental hazards such as marine pollutant (yes/no)

• Transport in bulk (per Annex II of MARPOL 73/78 and IBC Code)

• Special precautions which a user needs to be aware of or needs to comply with, in connection with transport or conveyance either within or outside their premises
Section 15: Regulatory Information

• To be GHS compliant, this section is provided, but compliance is outside OSHA jurisdiction
• Safety
• Health
• Environmental regulations specific to product
Section 16: Other Information

• No new requirements other than format

• Date of preparation of SDS or last revision date
The standard requires industry:

• To develop and implement a written hazard communication program

• To provide hazard communication training for employees:
  o Initially (to newly hired personnel)
  o Whenever a new hazard is introduced into the workplace
Written HAZCOMM Plan Should Include

• How SDS filing requirements are being met
• Type of labeling system being used
• Detailed information on training and compliance
• Methods to inform you of non-routine tasks and safe procedures
• Methods to inform outside contractors of the HAZCOMM program
Management of process spills or leaks:

• Implement the facility’s emergency control program

• Secure the area
Contractor Requirements

• Contractors must abide by the applicable provisions of federal, state and local hazard communication and right to know laws/regulations

• Any contractor found not meeting the provisions of the laws or contractor requirements may be required to cease work until compliance is achieved
Contractor Requirements

• The company will review and provide SDSs for any hazardous chemicals
• The contractor will maintain a copy of the hazard communication program
• The contractor will certify that it has met the provisions of applicable laws
• The contractor will notify the host safety department
• The contractor will state where chemicals will be used or stored
• Find good source for relevant/compliant SDSs
• Ensure accurate inventory of products and find corresponding new SDS
• Current classifications, labels, and packaging need to be noted for comparison
• Ensure new SDSs are in place and accessible
• Ensure all containers properly labeled including secondary containers
• Ensure all concerned are appropriately trained
Suggestions for making the transition:

1. Assemble new GHS information
2. Check implementation dates for:
   • Your country, and
   • Out-of-country clients
3. Plan the transition
4. Inventory in-house chemicals
5. Make a plan to:
   • Acquire,
   • Update, and
   • Manage SDS documents
6. Update workplace labels
7. Schedule/conduct employee training
• All facilities should have a hazard communication plan in a location that is accessible to all employees

• All hazardous products should be labeled and all employees should be aware of what and where they are

• SDSs should be available and accessible for all hazardous products
Do you see any problems here?

Large containers balanced on edge of shelf - not safe

If chemical, coffee can is not proper type of storage container

Maybe improperly labeled container - what’s in the coffee can? Coffee not allowed with chemicals; if chemical, not labeled properly
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