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SPECIAL REPORT

UNIVERSAL SYMBOLS FOR HAZARDOUS CHEMICALS
How New GHS Classification and Labeling Will Affect Your Plant

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Why GHS? Why Now?

International standardization enhances identification and worker safety

Introduction: Globally Harmonized System of Classification and Labeling (GHS)

The GHS, or globally harmonized system of classification and labeling of chemicals, grew out of a 1992 United Nations environmental conference and was formalized in 2003. The GHS aims to harmonize the way nations classify and label their hazardous chemicals across the globe.

In the United States, the GHS’s goals are being incorporated into the Occupational Safety and Health Administration’s (OSHA) Hazard Communication Standard (HCS). The HCS covers more than 945,000 hazardous chemicals in 7 million U.S. work sites; the revisions have a sweeping effect, most specifically on the material safety data sheets (MSDS) and warning labels that come with the purchase of most chemicals. These MSDS and labels give workers the “right to know” about chemical hazards they are exposed to, along with instructions for care in handling and for post-accident responses.

The GHS calls for standardized (new) formats and place new requirements on employers for effective workplace policies and retraining of personnel to learn the new standards.

What is the GHS?
The GHS is a system for standardizing and harmonizing the classification and labeling of chemicals. It is a logical and comprehensive approach to:

- defining health, physical and environmental hazards of chemicals
- creating classification processes that use available data on chemicals for comparison with the defined hazard criteria
- communicating hazard information, as well as protective measures, on labels and safety data sheets (SDS).

The GHS itself is not a regulation or standard. The United Nation’s GHS Document (referred to as “The Purple Book”) establishes agreed-hazard classification and communication provisions with explanatory information on how to apply the system. The elements
in the GHS supply a mechanism to meet the basic requirement of any hazard communication system, which is to decide if the chemical product produced and/or supplied is hazardous and to prepare a label and/or safety data sheet as appropriate.

Regulatory authorities, such as OSHA, in countries adopting the GHS thus have the ability to take the agreed criteria and provisions and implement them through their own regulatory process and procedures, rather than simply incorporating the text of the GHS into their national requirements.

**Why is the GHS needed?**

The production and use of chemicals is fundamental to all economies. The global chemical business is more than a $1.7 trillion per year enterprise. In the United States, chemicals are more than a $450 billion business and exports are greater than $80 billion per year.

The sound management of chemicals should include systems through which chemical hazards are identified and communicated to all who are potentially exposed. These groups include workers, consumers, emergency responders and the public. It is important to know which chemicals are present and/or used, their hazards to human health and the environment, and the means to control them.

Before GHS, many countries already had regulatory systems in place for these types of requirements. These systems may have been similar in content and approach, but their differences were significant enough to require multiple classifications, labels and safety data sheets for the same product when marketed in different countries, or even in the same country when parts of the life cycle are covered by different regulatory authorities. This lead to inconsistent protection for those potentially exposed to the chemicals and created extensive regulatory burdens on companies producing chemicals.

### The international mandate

The single most important force that drove the creation of the GHS was the international mandate adopted by the 1992 United Nations Conference on Environment and Development (UNCED), often called the “Earth Summit.” The harmonization of classification and labeling of chemicals was one of six program areas that were endorsed by the United Nations General Assembly to strengthen international efforts concerning the environmentally sound management of chemicals.

### Benefits of the GHS

There are significant benefits associated with the implementation of a globally harmonized approach to hazard communication. Countries, international orga-
First and foremost, implementation of the GHS enhances protection of people potentially exposed to chemicals and the environment.

First and foremost, implementation of the GHS enhances protection of people potentially exposed to chemicals and the environment. While some countries already have the benefits of protection under existing systems, the majority of countries do not have such comprehensive approaches. Thus implementation of the GHS provides these countries with the important protections that result from dissemination of information about chemical hazards and protective measures.

In the United States, the adoption of the GHS improves and builds on protections OSHA already had. Refinement of the information provided helps improve comprehensibility and thus makes it more likely the information results in workplace changes to protect employees. As already noted, the majority of affected employers and employees will benefit from incorporation of the GHS elements they’ll receive of better, more standardized, and consistent information about chemicals in their workplaces.

Secondly, the GHS facilitates international trade in chemicals. It reduces the burdens of having to comply with differing requirements for the same product, and it gives companies more opportunity for international trade. This is particularly important for small producers who may have previously avoided international trade because they did not have the compliance resources required to address the extensive regulatory requirements for classification and labeling of chemicals.

Third, one of the initial reasons this system was pursued internationally involved concerns about animal welfare and the proliferation of requirements for animal testing and evaluation. Where existing systems have different definitions of hazards, it often results in duplicative testing to produce data related to the varying levels of toxicity or cut-offs used to define the hazards in the different systems. The GHS reduces this duplicative testing. It should be noted that OSHA has no testing requirements. The HCS is based on collecting and evaluating the best available evidence on the hazards of each chemical.

In all countries, there is a need to acquire sufficient information to properly handle the chemical when it is imported from other countries. Thus having a coordinated and harmonized approach to the development and dissemination of information about chemicals is mutually beneficial to both importing and exporting countries.

The GHS benefits for U.S. producers

In the United States, the four primary regulatory agencies (OSHA, EPA, CPSC, and DOT) that are responsible for GHS implementation are not domestically harmonized in terms of definitions of hazards and other requirements related to classification and labeling of chemicals. Since most chemicals are produced in a workplace and shipped elsewhere, every manufacturer deals with at least two of the U.S. systems. Every producer is likely to experience some benefits from domestic harmonization of GHS, in addition to the benefits that will accrue to producers involved in international trade.

OSHA believes that adoption of the GHS also addresses some of the issues that have been discussed in the United States regarding the HCS and its implementation, such as improving label and SDS comprehensibility through implementation of a standardized approach. Having the information provided in the same words and pictograms on labels, as well as having a standardized order of information on the SDS, helps all users identify the critical information necessary to protect employees.

Scope of the GHS

The GHS covers chemicals in various stages of the life cycle, from production to disposal. It is based primarily on the hazards of chemicals. The GHS is designed to allow regulatory authorities to choose provisions that are appropriate to their particular scope of regulation. This is referred to as the “building block approach.” The GHS includes all of the building blocks or possible regulatory components that might be needed for classification and labeling requirements in the workplace, as well as for regulation of classification and labeling of pesticides.
chemicals in transport, and consumer products. The building block approach may also be applied in other ways when deciding which parts of the system to adopt. For example, the GHS includes classification criteria, labels, and safety data sheets. While workplace authorities like OSHA adopt all of these elements, it is expected that consumer product authorities will not have SDS requirements, nor will transport authorities.

The building block approach may also be applied to the criteria for defining hazards. For example, the acute toxicity criteria are much broader than those in the original HCS for workplace exposures. This is to allow consumer product authorities the tools they need to address the protection of children who might accidentally be exposed. OSHA does not need to adopt all of the categories of acute toxicity in order to protect employees from the types of exposures they may have.

In addition to the building block approach, the GHS also contains a number of areas that are left to the competent authority to determine how to apply the provision. Where OSHA is the competent authority, i.e., in terms of workplace protections in the United States, the agency expects to maintain its current approaches in terms of interpretations and accommodations regarding application.

Overall, the scope of the GHS with regard to chemicals covered, as well as types of chemicals and workplaces that are covered, is very similar to the HCS. The HCS has a very broad scope of coverage, ensuring that information is provided on all potential hazards in American workplaces. Adoption of the GHS maintains this broad coverage of hazards and chemicals. It should be noted that the GHS, like the HCS, does not require any new testing of chemicals. Evaluations of chemical hazards are to be based on the best available evidence.

The biggest difference between HCS and GHS
The original HCS requirements for labels simply indicated the minimal information required to be on them. At the time the standard was published, OSHA reviewed the current industry consensus standards for labels and focused on requiring information that was not generally present on most labels in use by the industry. The additional information included an identity that could be traced to more detailed information and specific information about both the health and physical hazards. Other types of information such as precautionary statements were not included in the requirements.

This performance-oriented approach was strongly supported by the chemical industry at the time the standard was adopted. It allowed existing labels to continue to be used in many situations, thus minimizing the impact on a number of producers.

However, an ultimate outcome has been that various suppliers’ organizational labels are not consistent and may not communicate adequately to users. While some producers follow voluntary industry consensus standards, others do not. Many large companies have developed their own libraries of phrases to be used on labels and safety data sheets, and undertaken translation of them into multiple languages. This is a considerable burden for a company to develop and maintain.

Other major existing systems considered in the harmonization process included specific label phrases to convey hazards and other information. Symbols and pictograms were also part of these systems. For purposes of developing an agreed upon harmonized approach, it was necessary to consider including such elements in the GHS.

For each class and category of hazard under the
GHS, there is a harmonized hazard statement, a signal word, and a pictogram specified. This is referred to as the core information for a chemical. Thus once an employer classifies a chemical, the GHS provides the specific core information to convey to users on that chemical. There are provisions to allow supplementary information as well so the chemical manufacturer is not limited to the specified core information. This addresses product liability concerns for U.S. employers and ensures they can include other information they consider to be necessary for that purpose.

Precautionary statements are also provided as examples in the GHS, but they have not yet been agreed upon and harmonized. This is expected to occur in the future as work on the system continues. These and several similar provisions or expectation will likely be the biggest difference between the updated HCS and the GHS.

There are a number of benefits to this standardized approach. First, employers and employees are given the same information on a chemical regardless of the supplier. This consistency improves communication of the hazards. It also improves communication for those who are not functionally literate or who are not literate in the language written on the label. Literacy of both types is a significant concern in American workplaces.

Secondly, having the core information developed already, translated into multiple languages, and readily available to whoever wishes to access it eliminates the burden of chemical manufacturers and importers developing and maintaining their own such systems. Thus the specification approach should be beneficial both to the producers and the users of chemicals.

Specific labeling requirements
Under the HCS, the SDS (see samples above) is the detailed reference source on the chemical. While labels provide a quick snapshot to remind employers and employees of the hazards of the chemical, the SDS addresses all aspects of hazard information, as well as methods for handling and use. The HCS specifies what information must be included on the SDS, but does not specify a format or order of information. Again, this approach was supported by producers to minimize the impact of the standard for those who already developed and disseminated the SDS.

Safety data sheets under the current HCS regulation are required to include:
- identification of the chemical or hazardous ingredients of a mixture
- physical and chemical characteristics
- health hazards, including signs, symptoms, and medical conditions that could be aggravated by exposure
- the primary routes of entry
- the OSHA permissible exposure limit, American Conference of Governmental Industrial Hygienists (ACHIG) threshold limit value, and any other recommended exposure limits
- whether the chemical is considered to be a carcinogen by OSHA, the International Agency for Research on Cancer, or the National Toxicology Program
- precautions for safe handling and use
- control measures
- emergency and first aid procedures
- date of preparation of the safety data sheet
- contact information for the responsible party.

Users of chemicals have always preferred a standardized approach. Many believe that having the information in the same place on every data sheet allows them to access it more effectively. OSHA published a request for information regarding ways to improve the information provided under the HCS (55 FR 20580; May 17, 1990), and received around 600 comments in response. The majority of the responses were in favor of a standardized format or order of information.

As a result of the users’ expressed preferences, chemical manufacturers in the United States developed a voluntary industry consensus standard that included an order of information for safety data sheets (ANSI Z400.1). This approach was later adopted into international voluntary industry consensus standards, as well.

The HCS allows any format to be used, so many
producers have been following the consensus standard order of information for some years. In negotiating the GHS, it was decided that this format should be adopted there, as well. One change was made, reversing the order of sections 2 and 3 so the hazard information appeared earlier in the sheet than information on chemical composition. Both the national and international industry consensus standards are being changed to be consistent with this approach.

The GHS data sheet is to include the following sixteen sections in this order:
- identification
- hazard identification
- composition/information on ingredients
- first aid measures
- firefighting measures
- accidental release measures
- handling and storage
- exposure controls/personal protection
- physical and chemical properties
- stability and reactivity
- toxicological information
- ecological information
- disposal considerations
- transport information
- regulatory information
- other information

Having a standardized order of information improves comprehensibility, which has been a continuing issue with regard to safety data sheets. It makes it easier for chemical producers to comply by providing them with a template to follow. Using the industry consensus standards also minimizes the burden of preparing new safety data sheets since many chemical producers already use the format specified. While the GHS safety data sheet does not address exposure limits in the titles of the sections, guidance on what should be included indicates that occupational exposure limits would be addressed under the “exposure controls” section. Countries may choose what to require in these sections in terms of occupational exposure limits.

Under the auspices of the International Program on Chemical Safety (IPCS), a series of more than 1,300 international chemical safety cards has been developed and translated into 14 languages. These cards are developed and peer reviewed by participating institutions in a number of countries, including the U.S. National Institute for Occupational Safety and Health (NIOSH). The cards are similar to the safety data sheets in terms of the information provided, but they are in a concise format of two pages. The cards are going to be updated to reflect the GHS criteria and hazard information. These may be found on NIOSH’s Web page at: http://www.cdc.gov/niosh/ipcs/nicstart.html.

OSHA also has a link to them on its hazard communication page. These cards are an excellent resource for many of the most common chemicals found in the workplace today.

As mentioned earlier, there is information required on a GHS SDS that is outside OSHA’s jurisdiction to regulate, specifically sections twelve through fifteen. This includes environmental and transport information. OSHA does not intend to propose requiring it on safety data sheets but will provide information about the provisions so chemical producers can include it if they wish to be completely consistent with the GHS. OSHA does not preclude such information being on a safety data sheet, but will not review or enforce the provisions of these four sections.

What to keep in mind with GHS
This personal guide is intended to help you understand and meet your obligations under OSHA’s evolving Hazard Communications Standard (HCS), which going forward will be adapted to harmonize with the GHS.

The important information for your knowledge and understanding about GHS was researched and compiled from Occupational Safety and Health Administration rules and regulations and from source materials on the GHS itself.

Most important features of the GHS to remember when you are addressing Hazardous Communications requirements are:
- the origins of the GHS and what its purpose is
- the international mandate that informs OSHA’s HCS
- what the HCS is and what benefits it offers
- MSDS labeling requirements under the GHS
- differences between the GHS and the HCS
- examples of GHS labels and pictograms.
5 Steps to Hazard Communication Compliance

Make sure your facility and all of your employees comply with the latest standards

OSHA’s Hazard Communication Standard (HCS or HazCom) is one of the most important occupational safety standards, as it ensures employees are made aware of the workplace hazards to which they may be exposed.

However, HazCom is regularly one of the most frequently violated OSHA standards. Year after year, employers find themselves struggling to create a compliant Hazard Communications program. Plus, with the recent revisions regarding the United Nations’ Globally Harmonized System (GHS) for Classification and Labeling for Chemicals, even more questions begin to abound.

To make sure your facility and all of your employees are in compliance with the latest hazard communications standards, follow these five simple steps:

Step 1: Develop a written Hazard Communication plan

Hazard communication plans should include a summary of the hazardous chemicals and contain your hazard communication program or policy. Documenting your organization’s policy for dealing with hazardous chemicals in the workplace is vital in ensuring safety with all employees.

Documenting your organization’s policy for dealing with hazardous chemicals in the workplace is vital in ensuring safety with all employees. Start by documenting a detailed program that includes the purpose and scope of your hazard communication policy, best practices for communicating chemical hazards, a review of up-to-date hazard communication standards, employee training programs, and a regular inspection schedule. Other details may be included as necessary. The program or policy you create should be developed, implemented, and maintained at each workplace.

According to OSHA’s 29 CFR 1910.1200(e) regulation, a written hazard communication program must include (at minimum):

- purpose and scope of the program
- a list of known hazardous chemicals in the workplace to be listed in the format of a safety data sheet (SDS)
- labels that coincide with correct and current information in the SDS
- useful training and information for employees to understand elements of past HazCom and new GHS labels and safety data sheets
- methods for updating, evaluating, and conveying information about chemical hazards
• methods to accomplish non-routine tasks surrounding hazardous chemicals and the associated risks involved in executing those tasks (i.e., cleaning reactor vessels)
• storage and transportation methods of hazardous chemicals and materials
• where and how employees must travel between workplaces and work shift changes when dealing with hazardous chemicals and materials.

**Step 2: Inventory all hazardous chemicals**

Take inventory of all the hazardous chemicals being used throughout your facility.

To comply with OSHA’s Hazard Communication Standard, you need to first understand the range of chemicals that you have on-site at your organization. All of the hazardous chemicals in your facility will need to be matched with a properly formatted SDS.

Your chemical inventory management system should also include the following details:
- location tracking
- container tracking and reconciliation reporting
- unit of measure conversions and calculations
- material approval routings
- managing restricted and banned chemicals
- notifications of exceeded thresholds.

**Step 3: Establish and maintain a complete library of safety data sheets**

Employees should have easy access to chemical safety data sheets at all times.

Now that you have your list of hazardous chemicals, it’s important to maintain the list in the form of chemical safety data sheets and create a comprehensive program that gives employees access to the SDS collection.

The program should include a full library of hazardous chemicals on-site. It should describe the process for accessing the individual sheets and make it easy for employees to implement updates and maintenance. Provide instructions for how to access an electronic SDS file system, if applicable, or any other off-site retrieval service.

Make sure to clearly post which employees are responsible for obtaining and maintaining the SDS library. Keep in mind that you may need to provide procedures for your employees to follow when the safety data sheets have not yet been received from the chemical manufacturer, or create another backup system involved with the entire SDS system.

When you receive your safety data sheets from chemical manufacturers, make sure your labels are in compliance with all of the elements of the SDS.

There are 16 elements that are included in a typical hazardous chemical SDS:
- identification of the substance or mixture and of the supplier
- hazards identification
- composition/information on ingredients
- first aid measures
Step 4: Label all containers, pipes, and tanks
Use highly visible labels to clearly communicate chemical hazards to your employees.

All of the chemicals in your organization’s facility that are stored in containers and tanks and run through pipes will need to be properly identified with a labeling system.

All pipes that carry hazardous chemicals must have a visible pipe marker that can be seen by everyone who encounters them.

The end goal in labeling chemicals should be that all employees, shipping personnel and others in contact with the chemicals can easily recognize which chemicals they are handling and quickly understand the hazardous risks involved.

To comply with the GHS regulations for labeling and classifying chemicals, remember to use proper label elements and foreign languages in line with the GHS labeling standards.

All the information on the hazardous chemical label should be easily accessible for employees on-site within the corresponding SDS.

Reference OSHA's CFR 1910.1200(f) for a list of requirements and information about various hazard classifications for labeling.

Step 5: Train and communicate the elements of Hazard Communication to your workforce
Regular employee training is essential to the success of your Hazard Communication program.

The final element to Hazard Communication compliance is ensuring that all affected employees are fully trained on all elements of OSHA's CFR 1910.1200 Hazard Communication Standard. Make sure all of your employees know how to read and interpret the hazardous chemical labels and safety data sheets. They should also know where the safety data sheets are stored and how to they can easily access them.

It’s important to keep up with new industry standards and retrain your employees accordingly. The Globally Harmonized Standard (GHS) for labeling and classifying hazardous chemicals is a great example of when employee training is necessary. It’s essential to ensuring a safe transition when new implementations are required.
Q. What is the GHS?
A. GHS stands for Globally Harmonized System. The GHS is an international regulation that the United Nations (UN) has created for the Classification and Labeling of Hazardous Chemicals.

Q. Why is GHS being implemented?
A. Without the GHS, countries around the world are left to determine their own standards for what chemicals are hazardous – and how to properly communicate those hazards. Each country handles this differently, which creates confusion and complexity for international manufacturers. The GHS is intended to create a single, universal format for hazard communication across the globe.

Q. When will the GHS be implemented in the United States?
A. OSHA is expected to publish an updated Hazard Communication Standard in August 2011 that will incorporate the major elements of GHS. It’s likely that there will be a three-year transitional period to allow companies to fully implement the new HazCom standard in their facilities.

Q. Where is GHS currently being implemented?
A. The European Union has already begun implementing many parts of the GHS regulation. Countries and regions around the world are beginning to implement it, each with its own individual timeline. Although it is an international standard, there is not one specific international implementation schedule. The GHS is a voluntary regulation set forth by the UN; each nation’s government is responsible for overseeing the regulatory changes and compliance.

Q. How will the GHS impact OSHA’s existing Hazard Communication regulation, CFR 1910.1200?
A. GHS will likely be applied within the current framework of OSHA’s existing hazard communication regulations. The GHS is not intended to replace OSHA’s standards, but instead update and add international
harmonized compliance to its schematics. For example, OSHA is expected to require hazard pictograms/symbols to all of the chemical labeling.

Q. Who will be affected by the new GHS?
A. The GHS will affect chemical suppliers, manufacturers, end users, and testing laboratories. Any workplace that is currently subject to the Hazard Communication regulations will be affected.

Q. What are the biggest changes that I need to know about?
A. There are three key changes that will be made during the implementation of the GHS:
- Classification of chemicals. The GHS will establish new criteria for classifying hazardous chemicals that is broader than the existing standards.
- Standardized label format. All chemical labels will have a standardized format with the certain headings and phrases to describe the various hazards.
- Standardized safety data sheets. The GHS safety data sheets will have a standard 16-section format with specific information required for each section.

Q. Where can I access information on hazard statements and precautionary statements for the GHS labeling?
A. All of the elements of the GHS labeling system can be found and accessed in Annex 1-3 of the

Visit www.BradyID.com/GHS to learn more about GHS and how to comply.
UN’s 3rd revised edition of the Globally Harmonized Standard for Classification and Labeling of Chemicals, found on their website.

Q. Will there be additional employee training needed for the new GHS?
A. Yes, employees will need to be trained in order to recognize and understand the new labels, pictograms and SDS information. Employees will need to learn how to interpret the pictograms and new hazard statements, and know what precautions must be taken for chemical products. The GHS is a bit more complex than the previous standards, and training will be very important to ensure that the GHS is an added safety measure in the workplace.

Q. What are the new GHS labeling elements?
A. The new standardized elements required for GHS labels include hazard pictograms, signal words, hazard statements, and precautionary statements.

- Hazard Pictograms: There are nine pictograms in total that symbolize health, physical and environmental hazard information. The pictograms are black and white images outlined in a red diamond.
- Signal Words: Either “Danger” or “Warning” is used to convey the level of severity of the hazardous chemical.
- Hazard Statements: Assigned phrases in relation to hazard classes and hazard categories detail the chemical’s hazards.
- Precautionary Statements: Detailed measures assigned to hazard statements are given to minimize or prevent the adverse effects from physical, health, or environmental hazards.

Q. What are the benefits of the GHS?
A. The GHS will make it easier for employers, employees and the public to understand the hazards of chemicals and take the necessary preventive and protective measures for their safety and health. It also offers a number of benefits for our government, companies and general public.

According to OSHA, here are the key benefits of GHS implementation:

- enhance the protection of human health and the environment by providing an internationally comprehensible system
- provide a recognized framework to develop regulations for those countries without existing systems
- facilitate international trade in chemicals whose hazards have been identified on an international basis
- reduce the need for testing and evaluation against multiple classification systems.

For more info, visit: http://www.osha.gov/dsg/hazcom/ghs.html.

Q. How does GHS affect the labeling requirements for shipping containers or secondary storage containers?
A. The GHS requires proper labeling when shipping or storing chemicals. The labels should be on the individual chemicals, as well as on the outside of the larger boxes or drums that are used to ship or store the chemicals. Proper DOT labeling must also be present that corresponds correctly with the GHS labeled chemicals.
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