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GHS Labeling Requirements: Pictograms, Durability, SDS & Everything Else You Need to Consider for Compliance

Year after year, HazCom violations are at the top of the OSHA top-ten list of most frequently cited standards. Which isn't surprising because what OSHA requires for compliance is determined by more than the mere presence of chemicals. Learn how to determine which standards apply and more tips for getting (and staying) compliant.

- ✓ An overview of GHS and how it fits into the overall OSHA HazCom standards
- ✓ Label information and durability requirements for chemicals in the work place
- ✓ How to create compliant GHS labels for primary and secondary chemical containers



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GHS Labeling Requirements: Pictograms, Durability, SDS & Everything Else You Need to Consider for Compliance

Whether you're in an office, on a construction site, manufacturing products or managing a warehouse, chances are high there are potentially hazardous chemicals in your workplace. Most workplace hazardous chemicals fall under the regulation of the Occupational Safety and Health Administration (OSHA) [Hazard Communication Standard](#) (HCS). Putting OSHA HCS into practice (HazCom) is critical for compliance and worker safety.

Yet year after year, HazCom violations are at the top of OSHA's "[Top Ten Most Frequently Cited Standards](#)" list, coming in at number two for the 2019 fiscal year. In fact, if you do a quick Google search of the top ten lists for OSHA citations going back to 2002, you'll see that HazCom violations haven't dipped below the number three spot in all that time. Why is HazCom such a sand trap for compliance citations?

In general, it's because what OSHA requires for compliance is determined by more than the mere presence of chemicals. The quantities, frequency of use and whether or not the chemicals may be shipped all help determine which standards apply.

When OSHA transitioned to using international standards for chemical safety (GHS) in 2016, this added another level of complexity for many employers and safety professionals. This white paper explores GHS labeling requirements in terms of what you need to know to get (and stay) compliant, including:

1. An overview of GHS and how it fits into the overall OSHA HazCom standards
2. Label information and durability requirements for chemicals in the workplace
3. How to create compliant GHS labels for primary and secondary chemical containers

GHS Overview: The Globally Harmonized System

GHS stands for Globally Harmonized System. Both are common shorter ways to refer to the United Nations document entitled, [The Globally Harmonized System of Classification and Labeling of Chemicals](#), which is also known as "The Purple Book." It is intended to provide an internationally standardized way to classify chemicals by type and align (harmonize) the way chemical safety information is provided on a label or a Safety Data Sheet (SDS)

The document from the UN is not a law. It's a set of guidelines considered best practices for chemical safety in the workplace. Yet many people mistakenly refer to GHS, in and of itself, as a law because those guidelines were [adopted by OSHA on March 26, 2012](#). The adoption of GHS guidelines was simply a revision to the existing OSHA HazCom standard, which is the actual law that must be followed in United States workplaces.

How does GHS fit into OSHA HazCom standards?

OSHA-compliant GHS chemical labels are one important aspect of HazCom that must follow GHS standards. However, there are a total of four HazCom areas that businesses must bring into compliance with GHS standards:

Hazard Classification

GHS hazard classification divides chemical hazards into health, physical and environmental categories and provides specific global criteria for classification.

Chemical Labels

GHS chemical labels are used on chemical containers to communicate the safety risks of the chemical inside and what to do to minimize those risks, including: (1) the name of the chemical, (2) where it came from (i.e. supplier information), (3) exactly what the hazards are, (4) what is the level of risk, (5) visual representation of the hazard (pictograms), (6) ways to minimize/prevent the hazard and first aid.

Safety Data Sheets

[GHS Safety Data Sheets](#) include sixteen sections with specific content guidelines for standardized communication. They must match GHS chemical labels and must be made available to employees in GHS-compliant SDS binders.

HazCom Training

Employees must be trained to recognize and understand GHS label elements and GHS Safety Data Sheets.

Who does HazCom and GHS impact?

GHS guidelines included in OSHA HazCom regulations primarily affect three types of businesses:

- Businesses that manufacture hazardous chemicals
- Businesses that import and/or distribute hazardous chemicals
- Any company that uses hazardous chemicals in processing or other workplace operations

In general, businesses that fall into one of those three categories are regulated by OSHA and must follow GHS guidelines for chemical safety. However, there are several exceptions to this rule depending on the types of chemicals and workplaces involved.

GHS exemptions

Chemicals regulated by another agency.

For example, some chemicals determined to cause unreasonable risk to public health or the environment are regulated by the Environmental Protection Agency (EPA). Whereas labeling requirements for consumer chemical products are governed by the [Consumer Product Safety Commission](#) (CPSC).

Most of the chemicals regulated by the EPA are covered in the [Toxic Substances Control Act](#) (TSCA). Six chemicals that are specified in the [basics of the statute](#): polychlorinated biphenyls (PCBs), asbestos, radon, lead, mercury and formaldehyde. However, the [Federal Insecticide, Fungicide, and Rodenticide Act](#) (FIFRA) provides for EPA regulation of pesticide safety among agricultural workers and other pesticide handlers as well.

Other examples of workplace chemicals regulated by other government agencies include cosmetics and drugs for personal consumption, which are regulated by the Food and Drug Administration (FDA), and food substances, which are regulated by the United States Department of Agriculture (USDA).

Chemicals regulated by a different OSHA standard.

Hazardous chemicals used in laboratories are regulated by OSHA but are NOT covered in the HazCom standard that incorporates GHS. Instead, the Occupational Exposure to Hazardous Chemicals in Laboratories Standard ([29 CFR 1910.1450](#)), commonly referred to as the Laboratory Standard, must be followed.

Consumer chemicals used in the same way a consumer would use them.

A great example of this would be household bleach wipes given to employees for disinfecting their workstation and tools as needed. Even with increased disinfecting during an outbreak such as COVID-19, the wipes would still be used in the same way any consumer would use them so the safety information on the consumer packaging is sufficient.

On the other hand, a bottle of common household bleach provided for janitorial workers to use for disinfecting would require GHS compliance, including providing available SDS. This is because the janitorial employees would be required to work with the bleach more often (and/or for longer periods of time) than the average consumer.

Workplace containers using HMIS/NFPA labels.

Once a chemical leaves your facility it must have a GHS label. Period. However chemical containers that are ONLY used within the facility are somewhat of a gray area when it comes to OSHA HazCom.

NFPA/HMIS labels can be used for workplace chemicals IF the employee is trained as if they had access to the full GHS-compliant label. This can be tricky because if something goes wrong, and your company chose to use NFPA/HMIS instead of GHS labels, there is a possibility you could be liable. We explore this more in depth under the section: "HMIS/NFPA vs. GHS Labels: Which should I use?"

Secondary container exemptions.




Only some secondary containers are exempt from any kind of chemical safety labels, and ONLY WHEN specific conditions are met. Firstly, the chemicals transferred to the secondary container must be intended for immediate use. Secondly, they must be used by the employee who transferred the contents from the primary container.

For example, in the disinfecting scenario above, a janitorial employee might transfer bleach from its primary container into a secondary container for diluting, use the solution, then dispose of it afterward. Because the solution was used in the *same shift, by the same employee*, no GHS label is needed.

GHS Label Requirements for Shipped Chemicals

6 elements of a compliant GHS label

1. **Product Name/Identifier:** This should match the product identifier on the Safety Data Sheet.
2. **Signal Word:** Signal words ensure GHS chemical labels indicate the relative severity of the hazard.
3. **Hazard Statement:** The nature of the hazard must be described on GHS chemical labels.
4. **Pictograms:** Globally standardized symbols convey health, physical and environmental information to transcend language barriers.
5. **Supplier Identification:** GHS chemical labels must include name, address and telephone number of the supplier.
6. **Precautionary Statements:** Any measures that could be employed to minimize and/or prevent the effects of the hazard must be communicated on GHS chemical labels. This includes first aid.

PRODUCT NAME or IDENTIFIER	SUPPLIER IDENTIFICATION	PRECAUTIONARY STATEMENTS
 1 Heptane	5 Hark Industries 1919 Empire Ave. Anaheim, CA 92806 (123) 456-7890	6 PRECAUTIONARY STATEMENTS Keep away from heat, flames, sparks. Wear protective gloves and face/eye protection. Avoid breathing fumes, gas or mist. Wash hands after handling. Use non-sparking tools. Use outdoors or in a well ventilated area. Ground container and receiving equipment. Use explosion-proof electrical, lighting, equipment. Prevent static discharge. Keep container tightly closed. RESPONSE If swallowed: Immediately call a poison center/doctor. Do not induce vomiting. If on skin: Remove contaminated clothing. Rinse skin with water. If irritation occurs, seek medical advice. If inhaled: Remove victim to fresh air. If feeling unwell, get medical attention. If in eyes: Rinse with water for several minutes. Remove contact lenses, if present and easy to do. If eye irritation persists, get medical attention. In case of fire: Use dry sand, dry chemical or alcohol resistant foam for extinction. STORAGE: Store locked up, in a cool, well-ventilated place. Keep container tightly closed. Dispose of contents to comply with local, state and federal regulations.
2 DANGER 3 Highly flammable liquid and vapor. May be fatal if enters airways. May cause dizziness. Causes skin irritation. Toxic to aquatic life with long lasting effects.	 4 Heptane UN 1206/ CAS# 142-82-5	 0123456789
SIGNAL WORD	HAZARD STATEMENTS	PICTOGRAMS

GHS Pictograms

GHS pictograms are specific graphics that communicate the hazards associated with a hazardous chemical. They're designed to be a simple, visual way to quickly and efficiently communicate chemical hazards without words. There are nine GHS pictograms in total, and even the colors and shape used are regulated.



Appendix C.2.3.1 to 29 CFR 1910.1200 states that the shape must be "a square set at a point," which simply means a diamond shape with four right angles. GHS pictograms must also include a black hazard symbol on a white background with a red border that's wide enough to be clearly visible.

These are the nine GHS pictograms and what they mean:



Health Hazard

Carcinogen , Mutagenicity, Reproductive Toxicity, Respiratory Sensitizer, Target Organ Toxicity, Aspiration Toxicity



Flame

Flammables, Pyrophorics, Self-Heating, Emits Flammable, Gas, Self-Reactives, Organic Peroxides



Exclamation Mark

Irritant (skin and eye), Skin Sensitizer, Acute Toxicity (harmful), Narcotic Effects, Respiratory Tract Irritant, Hazardous to Ozone Layer (Non-Mandatory)



Gas Cylinder

Gases Under Pressure



Corrosion

Skin Corrosion/Burns, Eye Damage, Corrosive to Metals



Exploding Bomb

Explosives, Self-Reactives, Organic Peroxides



Flame Over Circle

Oxidizers



Skull and Crossbones

Acute Toxicity (fatal or toxic)



Environment (Non-Mandatory)

Aquatic Toxicity

GHS Label Durability Requirements

GHS labels for the average workplace and GHS labels for chemicals shipped overseas have very different durability requirements. This is because:

1. the marine environment is extremely demanding and information must remain intact for whoever receives the shipment,
2. if a hazardous chemical shipment is lost at sea, information must remain intact for clean-up crews.

For hazardous chemical containers in the average workplace, OSHA GHS guidelines only specify that "...the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked..." with the appropriate information specified elsewhere in the standard.

Citations can be issued if the required safety information is no longer legible or intact. So it stands to reason, that although GHS guidelines do not specify exact label materials, they should be durable enough to preserve the label information in heavy-duty environments.

For the average workplace, GHS label considerations should include strong adhesives, durable materials, stable print and some level of chemical resistance.

GHS Label Durability Requirements for Shipping Overseas

If you are shipping chemicals via ocean freight, the GHS guidelines that encompass rules set forth by the International Maritime Organization (IMO) also apply to you. British Standard BS5609 is a requirement for International Maritime Dangerous Goods (IMDG) certification and deals with how well GHS chemical labels hold up in overseas shipping conditions.

In order to achieve IMDG compliance, GHS chemical labels must adhere to standards outlined in BS5609 Section 2 and 3.

BS5609 Section 2 requires that the blank GHS chemical label and adhesive can withstand a three-month saltwater submersion test. It also includes artificial salt spray and sunlight weathering tests.

Section 2 certified GHS chemical labels mean the label material itself (before any printing) is compliant with BS5609 Section 2 standards.

BS5609 Section 3 requires the fully printed label to meet or exceed certain standards for abrasion resistance and permanence of print. This includes testing printed GHS chemical labels with the same artificial salt spray and sunlight weathering plus additional tape removal and abrasion resistance testing.

Section 3 tests are conducted on specific GHS chemical labels printed with specific printers. Trustworthy manufacturers/sellers providing Section 2 certified GHS chemical labels should also provide a list of Section 3 certified printers that can be used with their products.

HMIS & NFPA vs. GHS Labels: Which Should I Use?

Technically, [workplace labeling](#) (i.e. labeling containers for chemicals only used within a single facility) can be done using alternative labeling systems, provided employees know and understand the system.

However, as mentioned previously in this article, this is a bit of gray area in OSHA HazCom. If something were to go wrong, and your company had chosen to use workplace labels that don't include all six of the GHS label elements, there is a possibility you could be liable.

From 1994 to 2012, the most prevalent voluntary workplace labeling systems were the Hazardous Materials Identification System (HMIS) and the National Fire Protection Association (NFPA). Prior to the adoption of GHS guidelines in 2012, [HMIS & NFPA labels](#) were the most widely used chemical labels for OSHA HazCom.

Even though the grace period for required businesses to fully convert to GHS ended in 2016, the question of whether to continue to use the previous voluntary workplace labeling systems or move to GHS is still very common. From the outside, reluctance to switch to GHS may seem purely due to the time, money and other resources required to replace old labels.

While resources definitely play an important role in HazCom labeling, there is a strong case for "sticking with what you know." Workers who have been trained on HMIS and NFPA are more comfortable with those systems and may find GHS HazCom labels confusing. Many employers just want to know: Can you still use HMIS and NFPA labels?

The official answer from OSHA [regarding HMIS & NFPA](#) is, "Yes, OSHA will continue to allow NFPA and/or HMIS rating systems on labels and SDSs as supplemental information. However, the rules for labeling and placement on the SDSs still apply."

OSHA's official answer goes on to explain that the current regulations allow for the use of existing labeling systems like HMIS and NFPA (based on HCS 1994) as long as they are consistent with the current requirements of the HCS. Additionally, supplemental labels can only be used for chemicals onsite within the facility and employees must understand the specific physical and health hazards.

However, there are three reasons employers should strongly consider moving to the use of labels that are fully GHS compliant:

Reason No.1. Shipments of new chemicals coming into the facility will have fully compliant GHS labels. If HMIS/NFPA labels are used for workplace secondary containers, then employees need to be trained on both systems. Therefore, moving to GHS-compliant HazCom labels streamlines training into one system.

Reason No.2. OSHA regulation 1910.1200(f)(6)(ii) outlines the information required on hazardous chemical labels, which includes physical and health hazards. These are standard elements required for GHS-compliant labels, yet not typically found on HMIS or NFPA labels. When an HMIS or NFPA label is used instead of a GHS label, employers must prove employees understand the hazards as well as they would have with a GHS label.

Reason No. 3. The numbering system for HMIS and NFPA are the opposite of GHS. One is the most serious hazard rating for GHS and the least serious for both HMIS and NFPA. While the numbers are not displayed on GHS labels, this still has the potential to cause confusion.

GHS			VS.			HMIS / NFPA		
1	Severe Hazard					0	Minimal Hazard	
2	Serious Hazard					1	Slight Hazard	
3	Moderate Hazard					2	Moderate Hazard	
4	Slight Hazard					3	Serious Hazard	
5	Minimal Hazard					4	Severe Hazard	

How to Create a Compliant GHS Label

For most workplaces, new hazardous chemicals coming into your facility should already come with labels that are fully GHS-compliant. If you are NOT removing or transferring the chemicals from their original containers all you have to do is maintain those labels and ensure they remain both intact and legible.

If you are transferring chemicals into secondary containers for storage, use by more than one person, exporting, or shipping between facilities you will need to create additional GHS-compliant labels for the secondary containers.

Step No. 1: Choose the label itself

Choose a GHS chemical label size, shape and material that fits the container and environment. Durable PET face stock that is waterproof, chemical, tear and abrasion resistant is ideal for creating GHS chemical labels in most environments. If the label will be applied to a container shipping overseas, double-check that the label material itself AND the printing process are compliant with BS5609 Section 2 and 3.

When in doubt it's always safer to go with [BS5609-certified GHS labels](#) and follow printing directions provided by the manufacturer for Section 3 compliance. If the GHS label meets those rigorous standards, you can reliably expect it to perform in average heavy-duty environments.

Step No. 2: Locate the information needed for your GHS label

If you have access to the original GHS label on the primary container, use that. You can also find the information you need on the Safety Data Sheet that should have accompanied the primary container. If there is no SDS, you must contact the supplier and request one. The burden of providing SDS is on the supplier.

You can also use an online chemical database to find the information you need. Or you can use [online label design software](#) that can help autofill your labels if you have the Chemical Abstract Service (CAS) registry number or the chemical name. For either option, you will still need to reference the SDS for supplier information and verify that the information matches.

There are sixteen sections of an SDS, however only Sections 1-3 are directly needed to fill out the six elements of a compliant GHS label. Here is a breakdown of exactly the sections you need to reference:

SDS Section 1 (Identification)

Section 1 includes the product name/identifier and information for supplier identification.

SDS Section 2 (Hazard(s) Identification)

Section 2 includes the signal word, hazard statements, pictograms and precautionary statements.

Section 3 (Composition/Information on Ingredients)

Section 3 is not required, but should definitely include the CAS number if it wasn't included in Section 1.

GHS Label Element	SDS Section
Product Name/Identifier	Section 1/Section 3
Signal Word	Section 2
Hazard Statement	Section 2
Pictograms	Section 2
Supplier Identification	Section 1
Precautionary Statements	Section 2

Step No. 3: Formatting your GHS labels

Label design is important for GHS label compliance mainly because pictograms are such a crucial part of the requirements. However, as with any HazCom, employee training and understanding of what is being communicated is also a compliance consideration.

With that in mind, it's important that your GHS labels are:

1. Easy to read (i.e. no blurry graphics, text too small to read, misaligned or cut off information, etc).
2. Laid out in a way that makes information easy to take in
3. Consistent throughout your facility so that employee training can easily align

Using professionally designed [GHS label templates](#) ensures that your labels are easy to read and the layout is practical. Choosing a template you can save on a computer or in the cloud makes it easier to create consistent GHS labels as needed.

Step No. 4: Printing GHS chemical labels

Print stability is an aspect of label durability that is often overlooked. When creating labels for heavy-duty environments, in general, you should make sure they're printed with the correct ink and process to ensure that the print does not lift, smudge, wear off or otherwise become illegible.

Print stability is an even more important consideration when creating GHS labels because:

1. Compliance rules are stricter
2. The print on the label may be subjected to drips and splashes from the contents of the container

GHS labels can be printed in your own facility, via a custom-printing service or some combination of the two. Methods for printing GHS labels include laser/inkjet printing and thermal transfer printing.



Printing GHS labels onsite using laser/inkjet printers. Developments in label technology have made it possible to [print GHS labels onsite](#) using standard laser or inkjet printers. The main benefit of using this type of GHS label is that no special printing equipment is required.

When printing your own GHS labels, following manufacturer-recommended printing methods and settings is critical for ensuring maximum print stability. Pay attention to whether the label material is designed to work with laser or pigment inkjet printers.

Thermal transfer printing onsite. Prior to [developments by Avery Industrial](#), thermal transfer printing had been one of the most common methods of printing GHS labels onsite. While printing thermal transfer GHS labels DOES require a specific printing machine with a two-color ribbon (black and red), it does NOT require toner or regular ink refills.

Thermal transfer GHS labels are highly stable when it comes to print quality. Additionally, [BS5906-certified thermal transfer labels](#) are available by the roll for use with common thermal transfer printing machines.

Custom-printed GHS labels. Having GHS labels custom printed by professionals reduces wear and tear on your facility printers and ensures high print quality. [Custom printing services](#) provided by the GHS label supplier are even better because they will know how to automatically choose the best ink and/or printing method for the label material.

When ordering custom-printed GHS labels for shipping overseas, it's vital to ensure the print process is done correctly to meet BS5609 Section 3 requirements. You must pay close attention to the material, ink and printing process when ordering custom GHS labels, or print directly with the label supplier so they can choose for you.

Preprinted GHS thermal transfer labels. This is a hybrid method of custom and onsite printing using thermal transfer labels and only a single-color (black) ribbon. Simply design a GHS label "shell" that contains certain GHS elements (especially the red diamond pictogram borders) and have it custom printed.

"Shells" for [preprinted GHS thermal transfer labels](#) are generally used in two ways: (1) the labels are preprinted with blank red diamonds, which you fill in with chemical information and print as needed (2) the labels are preprinted with pictograms and chemical or other information, leaving blank areas for reprinting with lot numbers, dates, barcodes and other variable information

Handwriting on preprinted labels. Preprinted GHS labels with blank areas can also be filled in by hand. Of course, this method does not work for BS5609 compliance. However, preprinted GHS labels that can be quickly filled by hand can be very useful for secondary labeling. For example, when a janitorial employee creates a bleach solution for disinfecting that will be used by several employees throughout the day.

Ongoing GHS Compliance Considerations

Ensuring chemical hazard safety in the workplace is an evolving process, and regulations such as GHS labeling requirements continue to be updated by both OSHA and the UN. The first adoption of GHS standards in OSHA HazCom was based on the third edition of "The Purple Book," which is in its seventh edition as of 2020.

In 2019 OSHA released "Update to the Hazard Communication Standard," [RIN 1218-AC93](#). The statement outlines plans to align with the seventh edition in the near future. OSHA may not adopt the new revisions in their entirety but is more likely to select changes that make sense for regulating hazardous chemicals in the US.

Expected changes in order to better align with the seventh edition include:

- Modified criteria for the categorization of flammable gases
- Updated health and physical hazard class definitions and categories
- Revised precautionary statements
- Additional information to be included in Section 9 of Safety Data Sheets (SDSs)

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Our award-winning Avery Industrial labels go beyond the premium paper labels our office customers know and love. They extend to durable products rigorously tested to perform in demanding industrial environments.

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