



GHS SOS!

The Label Maker's Chemical Drum Compliance Survival Guide

- Understand GHS guidelines, BS 5609 certification and more
- Learn what must go on the new label
- Find software programs to help you, explore printer options
- Get pre-approved labels now

Chemical drum labels are changing—are you? Effective June 1 hazardous chemicals crossing international waters **MUST MEET** new GHS safety standards. But what are they? And why does OSHA mandate them? There are many questions about BS 5609 testing, the new labels, and the approved inks, ribbons and printers that can be used to create them. That's why Mactac has stayed ahead of the standard—to keep you ahead of the change.

So be at ease if a container is lost at sea, because complete hazardous label compliance starts here!

You have questions—just not the time to research another new standard and the many options available to you. That's why Mactac created this guide to help navigate your labeling systems to safe harbor. Looking for something specific? Jump on ahead!

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GHS: 5 Important Things to Know

GHS is an acronym for The Globally Harmonized System of Classification and Labeling of Chemicals. It was adopted in 2003 by the United Nations and is enforced in the United States by OSHA (Occupational Safety & Health Administration). It is based on other major systems around the world, including OSHA's Hazard Communication Standard (HCS).

1. GHS is a comprehensive approach (a system or a collection of best practices – not a global law or regulation) to standardizing the classification of hazardous chemicals throughout the world. Its goal is to increase safety for any person who works with or who might come in contact with a hazardous chemical.
2. More than 65 countries have adopted or are in the process of adopting GHS. OSHA anticipates the latest revised standard will prevent more than 40 fatalities and more than 500 injuries a year.
3. Hazard information and protective steps are clearly communicated on all GHS labels and Safety Data Sheets (SDS). Standard elements of the label include signal words and black/red pictograms that define health, physical and environmental hazards of the chemical. Precautionary statements are also included.
4. The GHS mandates that drums containing hazardous chemicals meet British Standard 5609 when shipped by sea. BS 5609 is a requirement for self-adhesive drum labels needing International Maritime Dangerous Goods (IMDG) certification.
5. OSHA has modified its Hazard Communication Standard (HCS) to adopt the GHS and mandates compliance by June 1, 2015, for chemical manufacturers. Product distributors and end users have until December 1, 2015, to adopt the standard.

Ask OSHA

How has hazard classification changed? What new workplace labeling provisions must I be aware of? OSHA has prepared a comprehensive Q&A to address FAQs about GHS/HCS. Learn more at www.osha.gov/dsg/hazcom/hazcom-faq.html.

Did You Know?

Chemicals are a \$450 billion business in the United States (with \$80 billion in exports). The country uses more than 950,000 chemicals and U.S. manufacturers produce more than 42 million 55-gallon drums a year.

The New Label: What to Include

There are six key elements the new GHS label must include. The exact placement or location of the elements on the label is not specified.

1. Product Identifier/Ingredient Disclosure*

The chemical name, product name or other unique identifier

2. Signal Word

Indicates the level of severity of the hazard posed by the chemical (when required); "Danger" is used for more severe risks and "Warning" for less severe

3. Hazard Statement*

Standardized phrases that describe the nature and the degree of the hazard; examples of common statements include:

- Flammable liquid and vapor
- May be corrosive to metals
- Causes eye irritation
- Toxic in contact with skin
- May cause drowsiness or dizziness

4. Pictograms*

A black symbol on a white background with a red border which conveys information about the hazards of a chemical

- There are nine pictograms under GHS including Oxidizers, Explosives, Corrosives, Gases Under Pressure, Flame, Irritant, Toxins & Poison, Health Hazard, and Environment (environmental hazards are not within OSHA's jurisdiction and therefore only eight pictograms are required under HCS)

Proceed with Extreme Durability!

BS 5609 Explained - BS 5609 establishes durability criteria for pressure-sensitive, adhesive-coated labels for marine use. Also known as the Marine Immersion Label Testing Standard, it is recognized around the world as the standard labels must meet when hazardous chemical containers are shipped by vessel. IMDG requires BS 5609 certification for containers crossing international waterways. This same requirement does NOT apply to domestic shipments.

Why BS 5609? Because extremely durable labels become extremely important should a drum be lost at sea. Once retrieved, its contents—and the risks posed—must be easy for anyone, anywhere to understand. As such, labels must meet the toughest standards for adhesion, resistance to abrasion and print permanence.

Labels that have met the BS 5609 standard likewise meet Merchant Shipping Regulation 1990 Statutory Instrument 1990 No. 2605, which also concerns the safe shipment of dangerous materials by sea.

Testing Label Limits - BS 5609 testing is a two-part certification for both the label base material and the printed label. Each must be certified separately before the complete label is approved. Including marine immersion (salt water testing), labels must resist:

- Weathering (rain, snow, UV exposure)
- Temperature cycling (hot/cold fluctuations)
- Abrasion (scratching/tearing)
- Chemicals (alcohol, oil and acetone; solvent resistance)
- Fading and smudging

Smithers Pira, a worldwide authority on packaging, paper and print industry supply chains, conducts independent BS 5609 testing at its U.K.-based laboratories. Certification includes four parts in total but two—Section 2 and Section 3—are critical:

- Section 2 tests the base material and requires that labels withstand a three-month saltwater submersion test (carried out at a test site on the south coast of England). The test specifically looks for dimensional stability, peel adhesion and color fastness after long-term exposure to salt spray and sunlight.
- Section 3 tests the printed label for permanence, abrasion resistance (legibility and contrast after exposure to sand and artificial seawater) and color fastness. This includes the inks or ribbons and print methods or systems that were used to create the label.

For complete compliance it is necessary to validate specific combinations of base materials, inks/ribbons and print methods. Tests described in Section 3 can only be made on base labels that have already met Section 2 requirements.

Mactac has achieved Smithers Pira certification for a wide range of label combinations and can help you confidently meet the BS 5609 standard along with your production demands.

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5. Precautionary Statement*

Standardized phrases that describe the actions that should be taken to minimize or prevent adverse effects that result from exposure to the chemical or from improper handling and storage; example statements include:

- IF IN EYES: Rinse cautiously with water for several minutes
- Keep away from heat/sparks/open flames/hot surfaces
- No smoking
- Avoid breathing dust/fume/gas/mist/vapors/spray
- Vapors may be harmful if absorbed through the skin

6. Supplier Identification

Name, address and phone number of the chemical manufacturer, importer or other responsible party

*These come from the manufacturer Safety Data Sheet (SDS, formerly MSDS). The HCS requires chemical manufacturers, distributors and importers to provide SDSs. As of June 1, 2015, the HCS will also require new sheets to be in a uniform format. Consult OSHA for more info.

Step 1: Planning Your Label

Always begin with a sound understanding of your chemical container and the potential perils that await it. Answering these questions will go a long way to determining which labelstocks, inks or ribbons, and print systems are best suited to your needs. Better, you can have full confidence that costly and complicated non-compliance issues won't become a problem for your company. Questions to cover with your label supplier or expert advisor include:

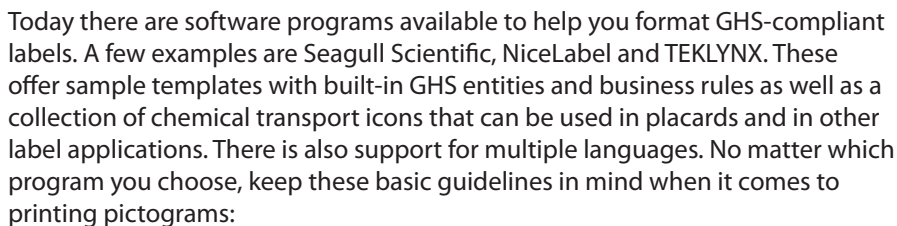
- What surface must the label adhere to? Is yours a smooth or textured steel drum, or is it plastic?
- What is the range of temperatures the container could be exposed to? Are extreme hot or cold conditions anticipated?
- Including saltwater and other potential environmental hazards? Is high humidity a concern?
- What is the expected life of the container? How long must the label last? Will labels be dispensed by hand or auto applied?
- How much rough handling must the drum endure? Beyond being loaded onto a vessel will it travel by road or rail? Will it come in contact with other containers?

Step 2: Designing Your Label

Often the first question is how big should the label be? Typically labels are large—up to 8.5". Small container labeling is the most challenging, however, due to all the information that must be included. Of course this all depends on the size of the container being labeled:

Container Size	Minimum Label Size
<3 Liters	74mm x 52mm (3"x2")
3-5 Liters	105mm x 74mm (4.13"x3")
5-500 Liters	148mm x 105mm (5.82"x4.13")
>500 Liters	210mm x 148mm (8.25"x5.82")

Next consider how many pictograms will be needed across all products—is it only a few or will all eight apply? This will help determine how much variety will be needed in the materials and methods you ultimately select. Generally speaking the more pictograms needed, the larger the label size will be. Or where there are three or fewer pictograms, a single label size could potentially cover all applications (red diamond outlines could also be pre-printed to streamline the process further).



- Must feature black symbol on white background with red frame wide enough to be clearly visible (specific pantone color of red is not specified)
- Red frames cannot be left blank, but can be covered with a black square
- Pictograms must be at least 1/15th the label size

Step 3: Printing Your Label

There are three main methods for printing GHS labels including thermal transfer as well as pigmented ink jet and color laser (toner fusion printing). Look to your supplier to understand the approved inks or ribbons that can be matched with these per BS 5609 testing. Whether you plan to use existing equipment or purchase new, each method has its own set of advantages.

1. Thermal Transfer (One- and Two-Color)

Most companies currently use a one-color or monochrome thermal transfer printer to satisfy labeling requirements. Due to the need for both red pictogram diamonds and black variable text on the new labels, it is common to use one printer with a black ribbon to print the text, and then feed the label into a second printer with a red ribbon to achieve the color objective. For many low- to mid-volume operations the simplicity and affordability of this sequenced approach makes it attractive (\$1,500-\$7,500 for a new printer).

- Example printers:
 - Zebra
 - Datamax
 - Intermec
 - Sato

A two-color thermal transfer printer (having two separate thermal print heads) allows for a standalone operation where both red and black ink can be printed on a single pass. In terms of operational efficiency and throughput, this often is the best option. An initial investment of \$10,000-\$12,000 is required. These printers are most popular in high-volume applications or where many different types of labels must be made.

- Example printers:
cab XC4/XC6
Plexo! 453/653



2. Pigmented Ink jet

Those looking for on-demand color printing will consider an ink jet solution. These use special inks and blank labels specifically approved for BS5609. The labels are instantly dry and having more color options means other kinds of labels can be made, too (for D.O.T. transport, for example). In some unique cases an extra-large label could be a challenge, given that most units can print up to 8.5" maximum width (the maximum label size requirement for GHS), but the total combination of cost (\$1,500-\$3,000) and convenience make ink jet printers a winning proposition for many.

- Example printers:

Epson C831	Primera LX2000
Epson C3500	VIP VP495
NeuraLabel 300x	

3. Color Laser (Toner Fusion Printing)

Color laser printers can be specifically purchased for running label stocks. These are roll fed units that print very quickly with full color (capable of 50,000 labels a day). This allows users to eliminate the need for ordering pre-printed labels, which can reduce inventory and wait times. It also means users can customize each label with variable information in full color—all in a single pass. While color laser printers tend to be on the high end of the cost scale (about \$16,000) they can represent an important investment for many chemical manufacturers and suppliers.

- Example printers:

iSys Label EDGE 850	Primera CX1200 & CX1000
NeuraLabel 500e	

Already Approved Combinations

Through joint efforts with prominent industry partners, Mactac offers pre-approved combinations of labelstock, adhesives, inks, ribbons and printers tested and certified to the BS 5609 standard. From resin ribbons to thermal printer packages to pre-approved labels using pigmented inks or digital label toners, we can assist with all your label needs.

Our GHS labeling solutions are in cooperation with other leading companies including:

- Armor (thermal transfer ribbons)
- cab (two-color thermal label printers)
- DNP (thermal transfer ribbons)
- Epson (color ink jet label printers)
- iimak (thermal transfer ribbons)
- iSys (digital label printers and toners)
- ITW Thermal Films (thermal transfer ribbons)
- Neuralog NeuraLabel (color ink jet label printers)
- Primera CX1200 & CX1000 (color digital printers)
- Primera LX2000 (color ink jet label printers)

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FAQs

The conversation is picking up as June 1st approaches. Following are some questions we're hearing from customers and answers you might be looking for...

Can you explain the difference between GHS and BS 5609? How does one relate to the other? Do I need both?

BS 5609 is the Marine Immersion Label testing standard. It defines durability requirements for pressure-sensitive labels used to identify hazardous chemicals being transported by sea. BS 5609 is a two-part certification for both the label material and the printed information on the label.

GHS is an internationally agreed-upon system, created by the United Nations for standardizing and harmonizing the classification and labeling of chemicals. While BS 5609 certification is not technically part of GHS, it is required by GHS for hazardous chemicals traveling international waterways (but not for domestic shipments).

If I want to qualify my inks, what is the approximate cost and amount of needed material?

These companies should contact Smithers Pira for a current quote (www.smitherspira.com). Contact: Maggie Carnegie (MCarnegie@smithers.com) or by phone: +44 (0)1372 802158. As of February 2015, approximate costs for testing to BS5609 – Section 3* only (printed, pressure-sensitive, adhesive coated labels) is \$2,360 (£1,525) excluding VAT plus \$1,415 (£915) excluding VAT for each additional sample tested at the same time.

- o Minimum sample size: 10 A4 sheets or equivalent
- o Test Period: 30-35 working days from receipt of samples and purchase order

*For BS5609 – Section 3 testing the printed labels must be manufactured from a label base complying with BS5609 – Section 2

What flexo inks are approved and what types are more likely to qualify: Water-based or UV?

Mactac is in the process of testing flexo inks to determine the best possible combinations. We are testing both water-based and UV inks but results are inconclusive at this time. Check back periodically or call us to discuss more.

If I pre-print with a flexo ink, can I still use an overlamine? Does the overlamine need to be qualified?

For BS5609 – Section 3 testing, the entire construction must be tested. So for instance, if you are printing with flexo inks and then overlaminating, that exact construction must be submitted for Section 3 testing. The same is true if you are using a thermal transfer, ink jet or color laser printer. The entire construction being used must be tested and certified for Section 3 in all cases.

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Besides the red and black print, can I print my company logo in color? If so, does the ink for the logo need to be qualified?

All inks must be tested, including any additional colors used in a company logo. If you are flexo printing a logo and then thermal transfer printing the GHS information, it must be tested with both flexo and thermal transfer printing included on the label. However, if the logo is being printed via qualified ink jet or color laser printers, it does not need to be re-tested, because all colors were tested on the original certification.

Can I leave pre-printed red diamond outlines or frames blank on the label? (For example, if I pre-printed three red diamonds but now only need to use two?)

No – the red diamond outlines or frames cannot be left blank or empty. They can be completely blacked out however as long as no red is visible.

Is there a list of printers approved for BS5609 – Section 3?

Yes, though technically it is not the printer itself that is recognized. Rather, it is the printer along with specific inks and ribbons that are certified as a combination to pass BS5609 – Section 3 testing. See MAC3107 for recommended and certified combinations.

Product Code	Facestock	Adhesive	Liner	BS 5609: 1986, Section 2	BS 5609: 1986, Section 3	Print Method
BDE6914	2.6 mil Matte White BOPP	MP690	3.2 SCK	✓	iimak Black Resin: SP330 & SP575, Ruby Red Resin: DC300, Green Resin: DC300, Bright Blue Resin: DC300, Yellow Resin: DC305	Flexo & TT printable
DSS4501	3.0 mil Matte White Polyethylene	705VHP	2.45 SCK	✓		Flexo & TT printable
DSS4511	3.0 mil Matte White Polyethylene	705VHP	3.2 SCK	✓		Flexo & TT printable
DT8001	3.0 mil Matte White Polyolefin	MF2030	3.2 SCK	✓		Flexo & TT printable
FCD6914	2 mil Gloss White Polyester	MP690	3.2 SCK	✓	ITW Thermal Films Black Resin: B324 & B325 and Red Resin: B324R; DNP Black Resin: R300 and Red Resin: R510; iimak Black Resin: SP330 & SP575, Ruby Red Resin: DC300, Green Resin: DC300, Bright Blue Resin: DC300, Yellow Resin: DC305 Armor SAS Black Resin: AXR8, AXR 7+, AXR 600 and Red Resin: AXR 600R	Flexo & TT printable
FDD6919	2 mil Matte White Polyester	MP690	3.4 C1S	✓	iSys Label EDGE 850 Digital Label Printer & Toner Primera CX1200 & CX1000 Color Digital Printer	Laser & Impact printable
JK4511 (Custom)	5 mil Kimdura Ink Jet	705VHP	3.2 SCK	✓	Epson C831 Pigmented Ink Jet; Epson C3500 Pigmented Ink Jet; NeuraLabel 300x Pigmented Ink Jet	Pigmented Ink Jet
JK8011	5 mil Kimdura Ink Jet	MF2030	3.2 SCK	✓	Epson C831 Pigmented Ink Jet; Epson C3500 Pigmented Ink Jet; NeuraLabel 300x Pigmented Ink Jet Primera LX2000 Pigmented Ink Jet	Pigmented Ink Jet
PJ6914	2.6 mil Gloss White BOPP	MP690	3.2 SCK	✓	iSys Label EDGE 850 Digital Label Printer & Toner	Flexo & TT printable
VDG6911	3.4 mil Matte White Vinyl	MP690	3.2 SCK	✓	ITW Thermal Films Black Wax-Resin: B128 and Red Wax-Resin: B120	Flexo & TT printable
VDG9511	3.4 mil Matte White Vinyl	ST-95	3.2 SCK	✓		Flexo & TT printable

More Help

Is your company prepared for GHS? No matter how far you've come, we can take you the rest of the way. Having your new labeling equipment and processes in place well ahead of the deadline will keep operations running smoothly and minimize noncompliance risks. And the time you save now can be spent later to educate employees about the changes. Contact your Mactac representative at 800.255.9733 or visit www.mactac.com to tap into our broad industry expertise when it comes to making GHS-compliant drum labels stick!