Fire codes and the GHS:
What to do when hazard classes don’t match

Actions you can take now to bridge the gap and help ensure safe conditions

Classifying hazardous materials to comply with fire and building codes can be challenging. And unfortunately, fire code hazard classes don't align well with the hazard categories found in safety data sheets and defined by the United Nations' Globally Harmonized System of Classification and Labelling of Chemicals (GHS). This lack of correlation can leave those responsible for identifying appropriate building protections or confirming code compliance unsure of how to proceed.

This article explains:

- why it's important to classify materials correctly,
- what the GHS is and how it works,
- the current state of alignment between fire codes and relevant regulations,
- the likely future of fire and building codes, and
- actions you can take right now to bridge the classification gap.

Why correct materials classification matters

Fire and building codes use material hazard classes and quantities to specify required building and area protections. These protections prevent, control, and mitigate dangerous conditions to safeguard building occupants, first responders, and the public. They're the only hazardous materials regulations governing the built environment, so it's essential to classify materials correctly.

The GHS

In 1992, the United Nations (UN) initiated the development of internationally adopted chemical regulation guidelines. These guidelines aligned different countries' chemical regulations and standards by harmonizing:

- the criteria used for classifying substances and mixtures according to their health, environmental, and physical hazards, and
- the hazard-related information found on labels and safety data sheets.

In 2003, the UN published the GHS, also referred to as the Purple Book. This reference provides classification criteria and hazard communication elements. It also guides countries and organizations in developing tools for implementing the GHS.

Since then, the UN has published revisions to the GHS every two years. These reflect new developments in science and technology and expand the explanatory and guidance sections.

It's not mandatory to use or adopt the GHS, but at least 67 countries have done so or are in the process of doing so.

An inter-agency workgroup—comprised of representatives from the Occupational Health and Safety Administration (OSHA), the US Department of Transportation (DOT), the Environmental Protection Agency (EPA), and the Consumer Product Safety Commission (CPSC)—helped to develop the GHS. Each agency establishes rules for one or more programs under GHS scope and, as such, has a vested interest in its guidance. For example, OSHA regulates chemicals in the workplace, so it is the lead agency for the classification of chemicals and hazard communication. DOT manages the transport of hazardous materials, and the EPA regulates pesticides and the environment. The CPSC, as its name indicates, oversees consumer product safety.

Current alignment of regulations

The following sections describe the correlation between the GHS and important fire codes and standards.

International Code Council (ICC)

The hazard class definitions and classification system used in the International Fire and Building Codes published by the ICC have their basis in OSHA's Hazard Communication Standard (HCS) (29 CFR 1910.1200) and DOT regulations (49 CFR Part 172) from the mid-1980s. Although the worldwide effort to standardize international classification criteria has been underway since 1992, the first significant change to the hazard classes in the International Fire Code (IFC) will likely appear in the 2024 edition. The proposed change addresses A2L refrigerants and adds definitions and hazard categories to align with the current GHS categories for flammable gases.

National Fire Protection Association (NFPA)

Early editions of NFPA's *Hazardous Materials Code* (NFPA 400) also utilized OSHA and DOT standards to define and establish hazard classes. This created a much-desired consistency

between the model codes. But, in recent years, NFPA made notable changes in the classification criteria for organic peroxides. As a result, the organic peroxide hazard classes in NFPA 400 (2022) now correlate with those found in the GHS Rev. 7 (2017).

NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*, uses unique definitions to establish hazard ratings found on the familiar NFPA hazard diamond. These signs guide emergency responders in dealing with hazardous materials located inside buildings and stationary tanks. And, given how familiar the emergency response community is with this symbol and the associated ratings, it's unlikely the NFPA 704 system will ever align with the GHS.

OSHA and HazCom

In 2012, OSHA significantly revised its HCS to align with the GHS (Rev. 3). The revised standard is called HazCom 2012. HazCom 2012 officially redefined the hazard classification criteria that manufacturers use to identify chemical hazards. It also changed how safety data sheets and container labels communicate that information to distributors, employers, and workers.

HazCom 2012 is still in effect, and most of its changes were required to be fully implemented by 2015. However, earlier this year, OSHA released a long-awaited Notice of Proposed Rulemaking that updates HazCom 2012 to Rev. 7 of the GHS and some elements of the 2019 GHS (Rev. 8). The proposed changes:

- revise health hazard definitions,
- update the skin corrosion and serious eye damage sections,
- modify the flammable gases hazard class,
- expand the aerosol hazard class to include non-flammable aerosols,
- add a physical hazard class for desensitized explosives, and
- introduce a new definition for combustible dust.

While OSHA and other federal agencies—and much of the world—better align regulations with the GHS, without change, the hazard classification system used by the fire and building codes will continue to diverge from it.

What does the future hold?

Updating fire and building codes to correlate with the GHS will be much more complex than adopting new hazard class definitions and criteria. Beyond the types of materials and degree of hazard, quantities in storage and use play a critical role in determining the fire and life safety controls needed in buildings. Thus, a complete re-evaluation of the risk presented and the maximum quantities allowed for each hazard class is required.

In the best-case scenario, the International Fire and Building Code could align with the GHS by 2027 (with state and local adoptions lagging by several years). But the needed code changes are significant and likely controversial, so 2030 is more realistic.

What you can do right now

Given the current situation, what can you do today to help bridge the gap between the GHS and fire code classification system?

Try taking at least one of the following actions:

1. **Subscribe to HMEx Assistant.** HMEx Assistant is an easy-to-use online tool. To develop HMEx, technical experts classified thousands of chemicals and mixtures using the International Fire and Building Code classification system. Quick searches reveal applicable hazard classes, ensuring consistent and reliable material classification across teams, projects, and jurisdictions. Beyond that, HMEx manages chemical inventory by evaluating quantities for compliance with code-established maximum quantity limits and generates reports needed by code officials.

Explore HMEx

2. **Download the GHS/fire code crosswalk.** The fire code crosswalk provides a side-by-side comparison of IFC, NFPA, and HazCom (GHS) definitions for the various hazard categories and classes. Also included are hazard statement codes found on safety data sheets for relevant GHS hazard categories. Because few of the hazard classes directly align, the crosswalk is only a reference tool. It is not a definitive guide to establishing applicable fire code hazard classes.

Get the crosswalk

3. **Stay informed and get involved.** Whether you classify materials or validate hazard classes that others have assigned, it's essential to know how the GHS hazard categories differ from fire code hazard classes. Stay informed about updates to HazCom and the GHS that impact classification and safety data sheets. Finally, get involved with the ICC and NFPA code development processes to help shape future codes.

If you have questions or need more information, contact us at info@hmexassistant.com or 360-389-3160.

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