



CAMPUS FIRE SAFETY CODE TALK

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Differences in Flammable / Combustible Liquids Classification – NFPA 30 versus OSHA’s Globally Harmonized System

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[Fifth in a series of articles dealing with flammable and combustible liquids. Prior articles are: *Safety Cans* (August 2011); *Flammable Liquids Storage Cabinets* (November 2011); *Safe Handling of Flammable and Combustible Liquids* (February 2014); and *NFPA 30 and MAQs* (January 2015).]

Introduction.

In this installment, I would like to discuss differences between the flammable / combustible liquids classification schemes used by NFPA 30, as spelled out in Chapter 4 of the Code, and the new Globally Harmonized System of Classification and Labeling of Chemicals (GHS), which has been adopted by the Occupational Safety and Health Administration (OSHA) under the Hazard Communication Standard (29 CFR 1910.1200). This is important as more and more GHS-labeled containers enter the campus setting (laboratories, workshops, etc.) and fire safety officers try to pair the terms used on the labels with the classification protocols of NFPA 30.

OSHA 1910.106. Historically, OSHA had relied on NFPA 30’s definitions and classification of liquids. In fact, OSHA’s rules on flammable and combustible liquids, which can be found in the *Code of Federal Regulations* (CFR), Title 29, Part 1910.106, are basically a restatement of the 1972 edition of NFPA 30. Until GHS, the only major difference between NFPA 30 and Part 1910.106 was the fact that NFPA 30 defined and included requirements for Class IIIB combustible liquids (flash point $\geq 200^{\circ}\text{F}$). Part 1910.106 also defined Class IIIB, but did not regulate it. However, 1910.106 included a provision whereby a Class IIIB liquid might be subject to its rules. This provision, in 1910.106(a)(18)(iii), read:

“When a combustible liquid is heated for use to within 30°F (16.7°C) of its flash point, it shall be handled in accordance with the requirements for the next lower class of liquid.”



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So, if you heated a Class II combustible liquid (let's say 135°F flash point) to 110°F, then 1910.106 required compliance with all the rules for a Class IC flammable liquid. More on this later.

As you'll see below, with the update of 1910.106 to accommodate GHS, OSHA still does not regulate what NFPA 30 calls a Class IIIB liquid, but it has radically altered its classification scheme and the temperature ranges associated with it, changes that might not be readily appreciated.

Demise of "Combustible". In the Globally Harmonized System, the word "combustible" is no longer used. Instead, the word "flammable" is used throughout. Table 1 shows the GHS classification, along with the comparable NFPA 30 liquid classes.

Table 1. Flammable Liquid Classification – Globally Harmonized System

Liquid Category	Flashpoint, °C (°F)	Boiling Point, °C (°F)	Comparable NFPA 30 Class
Flammable 1	<23 [<73.4]	≤35 [≤95]	Class IA
Flammable 2	<23 [<73.4]	>35 [>95]	Class IB
Flammable 3	≥23 & ≤60 [≥73.4 & ≤140]	n.a.	Class IC + Class II
Flammable 4	>60 & ≤93 [>140 & ≤199.4]	n.a.	Class IIIA
none			Class IIIB

Now, compare the temperature ranges for the four categories in Table 1 with those of the NFPA 30 liquid classes, as shown in Table 2.



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Table 2. Flammable Liquid Classification – NFPA 30

Liquid Category	Liquid Class	Flash Point, °F (°C)	Boiling Point, °F (°C)
Flammable	IA	<73 [<22.8]	<100 (37.8)
	IB	<73 [<22.8]	≥ 100 (37.8)
	IC	≥ 73 & <100 [≥ 22.8 & <37.8]	n.a.
Combustible	II	≥ 100 & <140 [≥ 37.8 & <60]	n.a.
	IIIA	≥ 140 & <200 [≥ 60 & <93]	n.a.
	IIIB	≥ 200 [≥ 93]	n.a.

Differences in Classification Schemes. When comparing Tables 1 and 2, note that the end points of the temperature ranges are different between the two. For example, NFPA 30 Class IA, the most hazardous class, includes liquids with flash points below 73°F (22.8°C) and boiling points below 100°F (37.8°C). The comparable group in GHS is Flammable Category 1, with flash points below 73.4°F (23°C) and boiling points below 95°F (35°C). The difference in flash point is probably not worth discussing, but the 5° difference in boiling point is. A quick search of the listings in the NFPA 325 section of the *Fire Protection Guide to Hazardous Materials* found a half dozen liquids, including pentane and petroleum naphtha, that move from the most hazardous class of NFPA 30 to the second most hazardous class of GHS. I've not compared the provisions of NFPA 30 to those of OSHA 1910.106 to determine whether there are any conflicts. (Maybe next installment.)



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GHS Flammable Category 3 The most significant difference, to me, is that GHS Flammable Category 3 embraces two different NFPA classes: IC and II. This I find problematic, since GHS 3 is covering under a single class liquids that could be governed as either flammable or combustible under NFPA 30, depending on their flash points. In this single class, OSHA includes liquids that NFPA 30 considers to be ignitable under ambient conditions, and liquids that NFPA 30 regards as requiring some degree of preheating before becoming ignitable. Also, Chapter 7 of NFPA 30 requires electrical area classification for Class IC liquids, while not requiring same for Class II.

Amending NFPA 30 to Accommodate GHS. During the current revision cycle for NFPA 30, the Technical Committee on Fundamentals, which is responsible for NFPA 30's definitions and the classification scheme, debated whether NFPA 30's could be amended to incorporate GHS. The Technical Committee determined that there was no easy way to accomplish this, without some corresponding change to the Flammable categories of GHS. NFPA 30 could, for example, alter the flash point temperature ranges for Classes IA and IB to match GHS. GHS's Flammable Category 4 is essentially identical to NFPA 30's Class IIIA. Class IIIB is unaffected. But, what to do about Classes IC and II? OSHA would have to be agreeable to splitting their Category 3 into Categories 3A (NFPA 30 Class IC) and 3B (NFPA 30 Class II). Whether this ever happens remains to be seen.

1910.106(a)(19)(iv). Recall the provision in the prior version of 1910.106, whereby a combustible liquid heated to within a certain range of its flash point is moved to the next lower class? This has been replaced with the following:

“1910.106(a)(19)(iv). When a liquid with a flash point greater than 199.4°F (93°C) is heated to within 30°F (16.7°C) of its flash point, it shall be handled in accordance with the requirements for a Category 4 liquid.”

So, “dropping” a liquid to the next lower category no longer applies to all liquids, just those that NFPA 30 would class as Class IIIB.



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