

## TechNotes Issue # 403 September 25, 2018

The following issue of TechNotes has been written by Robert (Bob) Upson, Manager of Engineering Services for the NFSA.

**"Flammable, inflammable & nonflammable... Why are there three?**

**Don't you think that two ought to serve the purpose?  
I mean either the thing flams or it doesn't!"**

- George Carlin

Back when I first heard George Carlin utter those words in the early 1980s I had no idea I would be applying them to real world fire protection problems one day. Many of the topics we write about in TechNotes are sparked by actual questions we receive through the Expert of the Day program. This one is no exception.

Just yesterday I received an EOD request from a couple of our members reviewing NICET exam questions. They had run across a question asking:

A material that, in the form in which it is used and under conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors, when subjected to flame or heat is?

- A. Inflammable
- B. Flammable
- C. Combustible
- D. Noncombustible
- E. Both A and D

The answer that was identified as 'correct' was 'E. Both A and D' which almost makes sense if you assume that 'inflammable' means 'not flammable' as would be the case with most English words. The problem is, English doesn't always make sense and flammable and inflammable mean exactly the same thing. The question above uses, word for word, the first half of the definition for 'noncombustible material' in **NFPA 13**. Unfortunately, whoever wrote that particular question assumed that 'inflammable' was equivalent to 'noncombustible'. As it turns out, even if we avoid using confusing words like 'inflammable', we still run into problems when it comes to understanding the meaning or context of words like flammable and combustible liquids because various

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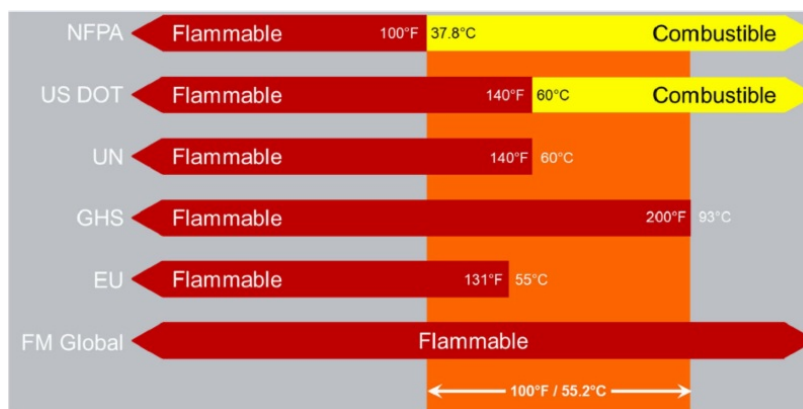
standards define them differently.

A series of Public Inputs were introduced during the first draft meeting for the 2021 edition of the **NFPA 30**, Flammable and Combustible Liquids Code, to remove the words 'flammable liquid' and 'combustible liquid' almost altogether and replace them in most cases with a new term, 'ignitable liquid'.

**3.3.33.3 Ignitable Liquid.** Any liquid or liquid mixture that will burn, which is one that has a measurable fire point.

**A3.3.33.3 Ignitable Liquid.** The term ignitable liquid refers to any liquid that will burn. Flammable liquids, combustible liquids, and inflammable liquids are all ignitable liquids.

The reality is that the difference between a flammable liquid and a combustible liquid is subjective. So subjective, in fact, that six major regulatory systems for ignitable liquids define them differently as shown in the graphic below.



The practical impact of this difference of opinion among regulatory agencies is that a typical warehouse operator, for instance, may need to be fluent in three or four different definitions of 'flammable' to meet every AHJ's regulatory requirements.

- Fire Marshal following NFPA 30
- Package markings and shipping papers following US DOT
- OSHA health and safety following the Global Harmonized System (GHS)
- Insurance regulations following FM Global (if it happens to be an FM insured property)

All of these agencies have one thing in common: The actual requirements for different ignitable liquids are based on their physical qualities. Most ignitable liquids are classified by their flash point with some of the most easily ignited further classified by their boiling point. It is only the naming convention of whether a particular liquid is called 'flammable' or 'combustible' that varies arbitrarily from one standard or regulation to another. The physical properties of the liquids remain the same.

### 3.3.5 Boiling Point.

The temperature at which the vapor pressure of a liquid equals the surrounding atmospheric pressure.



### 3.3.21 Flash Point.

The minimum temperature of a liquid at which sufficient vapor is given off to form an ignitable mixture with the air, near the surface of the liquid or within the vessel used, as determined by the appropriate test procedure and apparatus specified in Section 4.4.

Fire protection schemes are all based on flash point and miscibility. Ignition source and ventilation requirements are virtually all based on a flash point less than 100° F (or liquids heated above their flash point) while explosion hazard requirements are based on boiling points less than 100° F. The proposal made to the NFPA 30 Fundamentals Technical Committee (FLC-FUN) was to eliminate the labels and focus on the physical properties; to use the actual hazard to define the protection required. That proposal was approved by FLC-FUN and supported by the storage, operations, and tanks technical committees at the First Draft meeting.[1]

Some refinements were proposed by the other technical committees including the proposal that, for the next edition, the terms 'flammable' and 'combustible' will be retained in parentheses as a transitional measure. The NFPA definitions will remain in order to give other standards that reference NFPA 30 another code cycle to take any measures needed to transition to requirements that avoid the 'flammable' and 'combustible' labels. Additional modifications will probably be proposed at the Correlating Committee meeting this December.

#### 3.3.33.1 Combustible Liquid.

Any liquid that has a closed-cup flash point at or above 100°F (37.8°C), as determined by the test procedures and apparatus set forth in Section 4.4. Combustible liquids are classified according to Section 4.3.

**3.3.33.2\* Flammable Liquid.** Any liquid that has a closed-cup flash point below 100°F (37.8°C), as determined by the test procedures and apparatus set forth in Section 4.4, and a Reid vapor pressure that does not exceed an absolute pressure of 40 psi (276 kPa) at 100°F (37.8°C), as determined by ASTM D323, *Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method)*. Flammable liquids are classified according to Section 4.3.

The **NFPA 30** First Revision hasn't been balloted through the entire technical committee yet so this is still just a potential change but, given the strong support from all of the members present for the First Draft meetings, it would be surprising if it did not move forward and change the Flammable and Combustible Liquids Code to the Ignitable (Flammable and Combustible) Liquids Code in the 2021 edition. Stay tuned. Either it flams or it doesn't...

[1] Note that this proposal was also supported in concept by the **NFSA** Engineering and Standards Committee prior to the

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