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A Summary of Small-Scale Flammability Test Methods and Requirements

Some type of flammability testing is commonly performed on almost all materials which may be able to support combustion. In most cases, government regulation or industry standards require the tests, but tests may also be done for product safety and liability information.



Flammability testing is used to evaluate the fire hazards that are presented by a material or product. However, most small-scale flammability tests are not intended to directly simulate actual fire conditions. This is because there are simply too many variables and possible scenarios in real life -- variables such as temperature, humidity, the mass, orientation and shape of the material, air flow, available oxygen, the source and intensity of the ignition source, heat from radiance and/or conduction,

and so on. Instead of closely simulating actual conditions, a flammability test provides information on the nature of the material itself (e.g. its flashpoint or auto-ignition temperature) or information on the behavior of a material when subjected to a standardized, controlled ignition source (e.g. how fast the material burns when tested according to a specific standard).

Microbac performs a variety of small-scale flammability tests for clients in various industries. The following list is a brief summary of some of the more common tests used by different industries:

Automotive: Many of the materials used in the passenger compartment of cars are required to meet the requirements of a federal government standard, FMVSS 302 or 49 CFR 571.302. This standard limits the horizontal burn rate of materials to 102 mm/minute (4 inches per minute), when tested under the conditions specified in the standard.

Clothing: General clothing textiles are required by federal government regulations to meet burn rate standards found in 16 CFR 1610. This is a 45_i burn test which sets criteria for how fast a flame can travel a specified distance. There are also similar federal standards for children's sleepwear in 16 CFR 1615 and 16 CFR 1616.

Furniture: Mattresses are required to be resistant to cigarette smoldering according to federal regulation 16 CFR 1632, which is the same as California's Technical Bulletin 106. California also has requirements for upholstered furniture (Bulletins 116 and 117) which are also widely used elsewhere as standards for the cigarette and flame resistance of upholstery materials and filling materials.

Hazardous materials classification: The fire hazards presented by chemicals, whether solids, liquids or gases need to be understood for shipping regulations, MSDS publication, or waste

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disposal. Regulations and standards are set by organizations like DOT, OSHA, UN, IATA and others. Common properties that are measured by Microbac are:

Liquids `` flashpoint by ASTM standards D56, D92 and D93; upper and lower flammable concentration limits (commonly known as upper and lower explosion limits, or UEL and LEL) by ASTM E681.

Gases `` upper and lower flammable concentration limits by ASTM E681

Solids `` burn rate, self-heating materials, substances that emit flammable gases when in contact with water (DOT, UN and IATA standards).

Fire prevention or investigation: Whether or not there is a regulation that needs to be met, it is always wise to understand the fire hazards involved with the materials used in a product or process. These tests can assist in determining the risks involved with products so that steps can be taken to prevent fires. They can also provide help when trying to determine the cause of a fire. Some examples of these tests are:

ASTM D1929 `` auto-ignition temperature for solids

ASTM E659 `` auto-ignition temperature for liquids

ASTM E136 `` behavior of materials at 750jC

ASTM D3065 `` flammability of aerosol products

ASTM D635 and UL94 `` burn rate of plastics