



Standard Practice for Design of Fuel-Alcohol Manufacturing Facilities¹

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1. Scope

1.1 This practice shall apply to all fuel alcohol manufacturing facilities (FAMF) as defined in Terminology E 1705. This specification is primarily intended for, but not exclusively limited to fermentation ethanol processes.

1.2 This practice applies to both batch and continuous FAMF systems. Since a wide variety of equipment configurations can exist, this engineering practice will describe the necessary general requirements common to all FAMF facilities.

1.3 This practice is to be used in conjunction with applicable local, state, and Federal codes for designing, constructing, and operating FAMF facilities.

1.4 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* For hazard statement, see Section 11.

2. Referenced Documents

2.1 ASTM Standards:

E 1705 Terminology Relating to Biotechnology²

2.2 ANSI Standard:

Z21.22 Relief Valves and Automatic Shut-Off Devices for Hot Water Supply Systems³

2.3 ASME Standard:

Boiler Construction Codes, Sections I, IV, VII, and VIII⁴

2.4 Code of Federal Regulations Standard:

Bureau of Alcohol, Tax, and Firearms (BATF), Part 19, Title 27, Chapter 1⁵

¹ This practice is under the jurisdiction of ASTM Committee E-48 on Biotechnology and is the direct responsibility of Subcommittee E48.05 on Biomass Conversion Systems.

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² *Annual Book of ASTM Standards*, Vol 11.05.

³ Available from American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036.

⁴ Available from American Society of Mechanical Engineers, 345 E. 47th St., New York, NY 10017.

⁵ Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

2.5 NFPA Standard:

85A Prevention of Furnace Explosions in Fuel Oil and Natural Gas-Fired Single Burner Boiler-Furnaces⁶

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *accessible*, *n*—permitting close approach or contact that could include requiring removal or opening of an access panel or door.

3.1.2 *durability*, *n*—the quality of a component to perform as designed for its design life.

3.1.3 *extreme weather conditions*, *n*—environmental conditions that have occurred only once during the past 30 years.

3.1.4 *good engineering practices*, *n*—include design practices and criteria accepted in professional societies (ASTM, AIChE, ASME, ACS, etc.), proved by experience, verified by actual data, etc., that will meet the process, safety, and environmental requirements of the system.

3.1.5 *normal operating conditions*, *n*—the usual range of physical operating conditions (flow, pressure, temperature, etc.) for component or system.

3.1.6 *normal weather conditions*, *n*—the range of environmental conditions in a local climatic region that occurred during the past 30 years. This excludes extreme conditions that have occurred only once during that period.

4. Summary of Practice

4.1 The following procedures described provide minimum practices to be used in designing, constructing, operating, and modifying fuel alcohol manufacturing facilities. These practices are to provide guidelines that incorporate good engineering practices for personnel and organizations engaged in these FAMF activities.

4.2 These minimum practices are summarized in the following general categories of equipment as applicable:

4.2.1 *Vessels and Towers*—Cookers, fermenters, distillation stills, tanks, etc. (see Section 6).

4.2.2 *Heat-Exchange Equipment*—Exchangers, condensers, etc. (see Section 7).

4.2.3 *Rotating Equipment*—Pumps, blowers, compressors, fans, centrifuges, etc. (see Section 8).

4.2.4 *Electrical*—Motors, motor controls, etc. (see Section 9).

⁶ Available from National Fire Protection Assoc., Batterymarch Park, Quincy, MA 02269.