



Houston Fire Department Life Safety Bureau (LSB)



LSB Standard No. 22, Rev. 04

Tents and Other Membrane Structures

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LSB Standards are established in accordance with provisions of the City of Houston *Fire Code*. They are subject to the administrative sections covering alternative materials and methods, modifications, and the Board of Appeals.

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Tents and Other Membrane Structures

Section 22.1 – General

22.1.1 Scope.

The provisions of this standard shall apply to all tents, canopies, and membrane structures (air-supported, air-inflated, or tensioned membrane) within the City of Houston.

22.1.2 Purpose.

The purpose of this standard is to provide guidelines on the use and permitting requirements for temporary tents or other membrane structures in accordance with the City of Houston *Fire Code* and this standard.

Section 22.2 – Definitions

22.2.1 Air Supported Structure.

A structure wherein the shape of the structure is attained by air pressure and occupants of the structure are within the elevated pressure area.

22.2.2 Canopy.

A structure, enclosure, or shelter constructed of fabric or pliable material supported in any manner except by air or the contents that it protects, that is open (without sidewalls or drops) on 75% or more of its perimeter.

22.2.3 Place of Assembly.

For the purposes of this standard, a place of assembly is any assembly in which, or under which, 50 or more persons gather for any purpose. Examples of a place of assembly shall include, but are not limited to, a circus, carnival, tent show, theater, skating rink, dance hall, religious observance, or benefit function.

22.2.5 Tent.

A structure, enclosure, or shelter constructed of fabric or pliable material supported in any manner except by air or the contents that it protects.

Section 22.3 – Approval Requirements

22.3.1 Approval Required.

Tents, canopies, and membrane structures having an area of 1,200 square feet or more shall not be erected, operated, or maintained for any purpose without first obtaining a permit and approval from the Fire Marshal.

Exception: Tents used exclusively for recreational camping purposes.

22.3.2 Building Code Approval.

Tents and other membrane structures intended to be erected for other than temporary public assembly use and having an area in excess of 1,200 square feet shall require a permit and be approved by the Building Official. Where the tent or other membrane structure occupies the same property as other buildings or structures, those buildings or structures shall have posted on-site an approved Certificate of Occupancy issued in accordance with the *Building Code*.

22.3.3 Permit Required.

A Fire Marshal's approval is required to erect, for any purpose, a tent or other membrane structure having an area of 1,200 square feet or more. Permit applications submitted less than 5 days prior to the event will incur a priority inspection fee.

Permit Office contact information is as follows:

The Houston Permitting Center

1002 Washington Avenue

Houston, Texas 77002

Hours of operation: 8:00am to 3:30pm (CST)

Monday through Friday

Office phone: (832) 394-8811

To E-mail Customer Service Questions: hfd.permitoffice@houston.tx.gov

Link to City Wide Fee Schedule: www.houstoncityfees.org

22.3.4 Permit Approval.

Fire Department permits shall not be approved where an approved Certificate of Occupancy has not been issued for buildings or other structures on the same property where tents and/or other membrane structures are erected or proposed.

22.3.5 Plans Provided.

Where tents, canopies, and membrane structures (air-supported, air-inflated, or tensioned membrane) are used for assembly with an occupant load of 50 or more or used for temporary display or storage of goods and merchandise, detailed site and floor plans shall be provided with each permit application. The site and floor plan shall include details of the fire and emergency vehicle access, means of egress facilities, seating capacity, arrangement of the seating, location of stages, and location and type of any heating, cooking, and/or electrical equipment.

22.3.6 Period of Permitted Use.

Temporary tents, canopies, and membrane structures (air-supported, air-inflated, or tensioned membrane) shall not be used for any purpose for a period of **more than 180 days** within a 12-month period on a single premise.

Section 22.4 – Location

22.4.1 Location.

Temporary tents, canopies, and membrane structures (air-supported, air-inflated, or tensioned membrane) shall not be located within 20 feet of lot lines, buildings, other

temporary membrane structures, other tents and canopies, parked vehicles or internal combustion engines. For the purpose of determining required distances, support ropes and guy wires shall be considered as part of the temporary tent, canopy, or membrane structure. For exceptions to this rule, please see the City of Houston *Fire Code*.

22.4.2 Location of Structures in Excess of 15,000 Sq. Ft. in Area.

Temporary tents, canopies, and membrane structures (air-supported, air-inflated, or tensioned membrane) having an area of 15,000 square feet or more shall be located not less than 50 feet from any other tent or structure as measured from the side wall of the tent unless joined together by a corridor.

22.4.3 Connecting Corridors.

Temporary tents, canopies, and membrane structures (air-supported, air-inflated, or tensioned membrane) are allowed to be joined together by means of corridors. Exit doors shall be provided at each end of such corridor. On each side of such corridor, and approximately opposite each other, there shall be provided openings not less than 12 feet wide.

22.4.4 Fire Break.

An unobstructed fire break passageway or fire road not less than twelve (12) feet wide and free from guy ropes or other obstructions shall be maintained on all sides of all tents, canopies, and membrane structures (air-supported, air-inflated, or tensioned membrane) unless otherwise approved by the Fire Marshal.

22.4.5 Anchorage and Stability Required.

Temporary tents, canopies, and membrane structures (air-supported, air-inflated, or tensioned membrane) and their appurtenances shall be adequately roped, braced, and anchored to withstand the elements of weather and to prevent against collapsing. Documentation of structural stability shall be furnished to the Fire Marshal upon request.

Section 22.5 – Fire Safety Requirements

22.5.1 Flame Resistant Treatment.

Before a permit is granted, the property owner (permit holder) or owner's agent shall provide the Fire Marshal a certificate issued by an approved testing laboratory that certifies that the tents, canopies, membrane structures (air-supported, air-inflated, or tensioned membrane) and their appurtenances, sidewalls, drops, and tops of temporary membrane structures, tarpaulins, floor coverings, bunting, combustible decorative material and effects, (including sawdust when used on floors or on passageways):

1. Are composed of flame resistant material or shall be treated with a flame retardant in an approved manner; and
2. Meet the requirements for flame resistance as determined in accordance with NFPA 701; and
3. that such flame resistance is effective for the period specified by the permit.

22.5.2 Label.

Temporary tents, canopies, and membrane structures (air-supported, air-inflated, or tensioned membrane) shall have a permanently affixed label bearing identification of the size and fabric or material type. This label shall be located as to be readily accessible and legible.

22.5.3 Certification.

An affidavit or affirmation shall be provided to the Fire Marshal, and a copy shall be retained on the premises on which the temporary tent, canopy, or membrane structure (air-supported, air-inflated, or tensioned membrane) is located. This affidavit or affirmation must be readily available for inspection by the Fire Marshal. The affidavit shall attest to the following information relative to the flame resistance of the fabric:

1. Names and addresses of the owners of the tent or structure.
2. Date the fabric was last treated with flame resistant solution.
3. Trade name or kind of chemical used in the treatment.
4. Name of the person or firm treating the material.
5. Name of testing agency and test standard by which the fabric was tested.

22.5.4 Combustible Materials.

Hay, straw, shaving, or similar combustible materials shall not be located within any tent, canopy, or membrane structure containing an assembly occupancy. Sawdust and shaving that are utilized for a public performance or exhibit may be permitted, provided the sawdust or shavings are dampened with water so that dust is not produced from the sawdust or shavings. Combustible materials shall not be permitted under stands or seats at any time. The areas within and adjacent to the tent, canopy, or membrane structure shall be maintained clear, within 20 feet of the structure, of all combustible materials or vegetation that could create a fire hazard. Combustible trash shall be removed at least once a day from the structure and stored in approved containers located at least 20 feet from the structure.

Exception: The materials necessary for the daily feeding and care of animals.

22.5.5 Interior Contents Clearance.

There shall be a minimum clearance of at least three (3) feet between the fabric of the tent, air-supported structure, or other membrane structure serving as the building envelope and all contents located inside the air supported structure.

22.5.6 Smoking Prohibition.

Smoking shall not be permitted in temporary tents, canopies, and membrane structures (air-supported, air-inflated, or tensioned membrane). Approved "No Smoking" signs shall be conspicuously posted at all entrances into, and exits from, the structure at any location where alcoholic beverages may be dispensed, and in accordance with the Houston *Fire Code*.

22.5.7 Open or Exposed Flame.

The following shall not be permitted inside, or located within twenty (20) feet of, any temporary tent, canopy, or membrane structure (air-supported, air-inflated, or tensioned membrane) that is open to the public (unless approved by the Fire Marshal): open flames; devices emitting flame, fire, heat, flammable or combustible liquids; gas, charcoal or other cooking devices; or any unapproved devices.

22.5.8 Pyrotechnic Displays.

Pyrotechnic displays shall not be used within 100 feet of any temporary tent, canopy, or membrane structure (air-supported, air-inflated, or tensioned membrane).

22.5.9 Spot Lighting.

Spot or effect lighting shall only be powered by electricity, and all combustible construction located within 6 feet of such equipment shall be protected with approved noncombustible insulation not less than 9.25 inches thick.

22.5.10 Safety Film.

Motion pictures shall not be displayed in any temporary tent, canopy, or membrane structure (air-supported, air-inflated, or tensioned membrane) unless the motion picture film is safety film.

22.5.11 Electrical Lighting, Wiring, and Equipment.

All electrical lighting, wiring, and equipment shall comply with the *Electrical Code*. Temporary wiring shall be in accordance with the *Electrical Code* and shall not be affixed to metal supports of a temporary tent, canopy, or membrane structure (air-supported, air-inflated, or tensioned membrane) except in a manner approved by the Fire Marshal. Extension cord and multi-adapter use shall be in accordance with the *Fire Code*. All decorative and/or seasonal lighting, wiring, and devices shall be UL (or similarly approved) listed.

Section 22.6 – Fire Protection

22.6.1 Fire Extinguishers.

Listed portable fire extinguishers shall be provided in every temporary tent, canopy, or membrane structure (air-supported, air-inflated, or tensioned membrane) as follows:

1. For 200-500 square feet of floor area: One 2-A, 10-B:C rated portable fire extinguisher.
For 501-1000 square feet of floor area: Two 2-A, 10-B:C rated portable fire extinguishers.
For each additional 2000 square feet of floor area or fraction thereof: One 2-A, 10-B:C rated portable fire extinguisher.
2. As required by the Fire Marshal, at least one 40-B:C rated portable fire extinguisher shall be provided for each kitchen, mess hall, power generator, or

transformer at locations where flammable and combustible liquids are used, stored, or dispensed.

3. All fire extinguishers shall have a current annual service tag attached by an approved licensed fire protection equipment company in compliance with LSB No. 2.
4. Portable fire extinguishers shall be maintained in a fully charged and operable condition.
5. Portable fire extinguishers shall be conspicuously located where they will be readily accessible and immediately available in the event of fire located along normal unobstructed paths of travel, including exits from areas.

22.6.2 Fire Protection Equipment.

Fire hose lines, water supplies, and other auxiliary fire equipment shall be maintained at the site and in such numbers and sizes required by the Fire Marshal.

Section 22.7 – Occupant Load and Seating

22.7.1 Occupant Loads.

The occupant load allowed in an assembly structure, or portion thereof, shall be determined in accordance with the *Fire Code*.

Maximum Floor Area Allowance Per Occupant:

Assembly without fixed seats:

Concentrated (chairs only-not fixed) = 7 sq. ft. per person

Standing space = 5 sq. ft. per person

Unconcentrated (tables and chairs) = 15 sq. ft. per person

22.7.2 Seating Arrangements.

Seating in temporary tents, canopies, or membrane structures (air-supported, air-inflated, or tensioned membrane) shall be in accordance with the *Fire Code*.

22.7.3 Posting of Occupant Load.

Where a temporary tent, canopy, or membrane structure (air-supported, air-inflated, or tensioned membrane) with an occupant load of 50 or more is used for assembly, the design occupant load of the structure within the covered area, or the aggregate design occupant load of the structure plus the enclosed area containing the membrane structure shall be posted in a conspicuous place near the main access doorway or doorways. Where no doorway is provided the occupant load sign shall be posted at a designated location approved by the code official and fire code official. Posted signs shall be of an approved legible design, constructed of weather-resistant materials, and must indicate the design occupant load (number of occupants permitted) within the covered and/or enclosed area containing the structure. Posted signs shall be maintained by the property owner (permit holder) or the owner's authorized agent.

Section 22.8 – Exits

22.8.1 Number Required.

Temporary tents, canopies, membrane structures (air-supported, air-inflated, or tensioned membrane) or the usable portion thereof shall have at least one exit, but not less than the number of exits required by the *Fire Code*. The widths of means of egress required shall be divided approximately equally among the separate means of egress. The total width of means of egress in inches shall not be less than the total occupant load served by a means of egress multiplied by 0.2 inches per person. (See Table 22.8 of Appendix A.)

22.8.2 Distribution of Exits.

Exits shall be placed at approximately equal intervals around the perimeter of the temporary tent, canopy, or membrane structure (air-supported, air-inflated, or tensioned membrane) and shall be located such that all points are 100 feet or less from an exit.

22.8.3 Exit Openings.

Exit openings from tents shall remain open unless covered by a flame-resistant curtain. The curtain shall comply with the following requirements:

1. Curtains shall be free sliding on a metal support. The support shall be a minimum of 80 inches above the floor level at the exit. The curtains shall be so arranged that, when open, no part of the curtain obstructs the exit.
2. Curtains shall be of a color, or colors, that contrast with the color of the tent.

22.8.4 Doors.

Exit doors shall swing in the direction of exit travel. To avoid hazardous air and pressure loss, such doors shall be automatic closing against operating pressure. Opening force at the door edge shall not exceed 15 pounds.

22.8.5 Aisles.

The width of aisles without fixed seating shall be in accordance with the following:

1. In areas serving employees only, the minimum aisle width shall be 24 inches.
2. In public areas, smooth-surfaced, unobstructed aisles having a minimum width of not less than 44 inches shall be provided from seating areas. Aisles shall be progressively increased in width to provide, at all points, not less than 1 foot of aisle width for each 50 persons served by such aisle at that point.

22.8.6 Aisle Arrangement and Maintenance.

The arrangement of aisles shall be subject to approval by the Fire Marshal; aisles shall be maintained clear at all times during occupancy.

22.8.7 Exit Signs.

Exits shall be clearly marked. Exit signs shall be installed at required exit doorways and where otherwise necessary to indicate clearly the direction of egress when the exit serves an occupant load of 50 or more.

22.8.8 Exit Sign Illumination.

Exit signs shall be of an approved self-luminous type or shall be internally or externally illuminated by fixtures supplied in the following manner:

1. Two separate circuits, one of which shall be separate from all other circuits, for occupant loads of 300 or less, or;
2. Two separate sources of power, one of which shall be an approved emergency system, shall be provided when the occupant load exceeds 300. Emergency systems shall be supplied from storage batteries or the on-site generator set, and the system shall be installed in accordance with the *Electrical Code*.

22.8.9 Means of Egress Illumination.

While the structure is occupied, means of egress shall be illuminated with light having an intensity of not less than 1 foot-candle (11 lux) at floor level. Fixtures required for means of egress illumination shall be supplied from a circuit or source of power that is separate from _____.

22.8.10 Maintenance of Means of Egress.

The required width of exits, aisles, and passageways shall be maintained at all times to a public way. Guy wires, guy ropes, and other support members shall not cross a means of egress at a height of not less than 8 feet. The surface of means of egress shall be maintained in an approved manner.

Section 22.9 – Heating and Cooking Equipment

22.9.1 Cooking.

Cooking is prohibited in temporary tents, canopies, or membrane structures (air-supported, air-inflated, or tensioned membrane).

Exception: Tents approved and specifically designated by the Fire Marshal for cooking operations.

22.9.2 Food Preparation Operations.

Temporary tents, canopies, and membrane structures (air-supported, air-inflated, or tensioned membrane) which will contain operations that are fueled by solid flammables, butane, or other similar devices that do not pose an ignition hazard shall be located in an approved location and adequately protected to prevent tampering, damage by vehicles or other hazards. Examples of this type of operation include cooking demonstrations or food warming.

22.9.3 Cooking Tents.

Tents where cooking is performed shall be separated from other tents, canopies, or membrane structures (air-supported, air-inflated, or tensioned membrane) by a minimum of 20 feet.

22.9.4 Cooking Location.

Within cooking tents, the cooking and heating equipment shall not be located within 10 feet of exits or combustible materials.

22.9.5 Outdoor Cooking.

Outdoor cooking that produces sparks or grease-laden vapors shall not be performed within 20 feet from a tent, canopy, or membrane structure (air-supported, air-inflated, or tensioned membrane).

22.9.6 Electrical Heating and Cooking Equipment.

Electrical heating and cooking equipment shall comply with the *Electrical Code*.

22.9.7 LP-Gas Use.

22.9.7.1 General.

LP-gas equipment such as tanks, piping, hoses, fittings, valves, tubing, and other related components shall be approved and in accordance with the *Fuel Gas Code* and the *Fire Code*.

22.9.7.2 Location of Containers.

LP-gas containers shall be located outside. Safety release valves shall be pointed away from the tent, canopy, or membrane structure (air-supported, air-inflated, or tensioned membrane).

22.9.7.2.1 Containers 500 Gallons or Less.

Portable LP-gas containers of 500 gallons or less capacity shall have a minimum separation between containers and structure of not less than 10 feet.

22.9.7.2.2 Containers More Than 500 Gallons.

Portable LP-gas containers of more than 500 gallons capacity shall have a minimum separation between containers and structure of not less than 25 feet.

22.9.7.2.3 Protection and Security.

Portable LP-gas containers, piping, valves, and fittings which are located outside and being used to fuel equipment inside a tent, canopy, or membrane structure (air-supported, air-inflated, or tensioned membrane) shall be located in an approved location and adequately protected to prevent tampering, damage by vehicles, or other hazards. Portable LP-gas containers shall be securely fastened in place to prevent unauthorized movement.

Section 22.10 – Flammable and Combustible Liquids

22.10.1 Use.

Flammable liquid fueled equipment shall not be used in temporary tents, canopies, or membrane structures (air-supported, air-inflated, or tensioned membrane).

22.10.2 Storage.

Flammable and combustible liquids shall be stored outside in an approved manner and not less than 50 feet from temporary tents, canopies, and membrane structures (air-supported, air-inflated, or tensioned membrane). Storage shall be in accordance with the *Fire Code*.

22.10.3 Refueling.

Refueling shall be performed in an approved location not less than 20 feet from temporary tents, canopies, or membrane structures (air-supported, air-inflated, or tensioned membrane).

22.10.4 Spills.

Flammable and combustible liquid spills shall be cleaned up immediately and disposed of in an approved manner.

Section 22.11 – Liquid and Gas Fueled Vehicles

22.11.1 Display of Motor Vehicles.

Liquid and gas fueled vehicles and equipment intended for display within temporary tents, canopies, and membrane structures (air-supported, air-inflated, or tensioned membrane) shall be in accordance with the *Fire Code* and LSB Standard No. 25, "Safety Inspections for Vehicles on Indoor Display."

22.11.2 Competitions and Demonstrations.

Liquid and gas fueled vehicles and equipment used for competition or demonstration within a temporary tent, canopy, or membrane structure (air-supported, air-inflated, or tensioned membrane) shall comply with the *Fire Code*.

22.11.3 Generators.

Generators and other internal combustion power sources shall be separated from temporary tents, canopies, or membrane structures (air-supported, air-inflated, or tensioned membrane) by a minimum of 20 feet and shall be isolated from contact with the public by fencing, enclosure, or other approved means.

22.11.4 Fuel Storage.

Fuel for vehicles or equipment shall be stored in approved containers at an approved location outside of the structure and not less than 50 feet from temporary tents, canopies, or membrane structures (air-supported, air-inflated, or tensioned membrane). Storage shall be in accordance with the *Fire Code*.

22.11.5 Fueling.

Refueling shall be performed outside of the structure in an approved location not less than 20 feet from temporary tents, canopies, or membrane structures (air-supported, air-inflated, or tensioned membrane).

22.11.6 Spills.

Fuel spills shall be cleaned up immediately and disposed of in an approved manner.

Section 22.12 – Housekeeping

22.12.1 Vegetation Removal.

Combustible vegetation shall be removed from the area occupied by a temporary tent, canopy, or membrane structure (air-supported, air-inflated, or tensioned membrane) and from areas within 30 feet of such structures.

22.12.2 Waste Material.

The floor surface inside a temporary tent, canopy, or membrane structure (air-supported, air-inflated, or tensioned membrane) and the grounds outside within a 30-foot perimeter shall be kept clear of trash and combustible waste accumulation. Such waste shall be stored in approved containers until removed from the premises.

Section 22.13 – Standby Personnel

22.13.1 General.

In accordance with the *Fire Code*, the Fire Marshal is authorized to require one or more standby inspectors be present in a place of assembly or any other place where people congregate when the Fire Marshal deems it essential for public safety because of the number of persons or the nature of the performance, exhibition, display, or contest activity. When standby inspectors are required, the owner, agent, or lessee shall employ one or more approved standby personnel on duty. The jurisdiction shall provide the standby personnel upon payment of fees specified in the *Fire Code*, and the standby personnel assigned shall be in uniform and shall remain on duty during the times such places are open to the public or when such activity is being conducted.

22.13.2 Crowd Managers.

The owner, agent, or lessee shall provide trained crowd managers or crowd manager supervisors at a ratio of one crowd manager/supervisor for every 250 occupants in a place of assembly or any other place where people congregate, when the Fire Marshal deems it essential for public safety because of the number of persons, or the nature of the performance, contest, or activity.

Section 22.14 – Occupancy Capacity Signs

22.14.1 Where Required.

In a tent, canopy, or membrane structure (air-supported, air-inflated, or tensioned membrane) that is subdivided into rooms, each room that is used for classroom, assembly, or similar purpose having: 1) an occupant load of 50 or more; and 2) no fixed seating installed shall have its maximum occupancy capacity posted on an approved sign adjacent to the main exit of the room. Additional signs may be required as deemed necessary by the Fire Marshal for rooms without a distinct main exit or multiple main exits. (The maximum occupant load in a building or portion of a building shall not exceed the amount specified in the *Building Code*.)

22.14.2 Sub-Dividable Rooms.

In a tent, canopy, or membrane structure (air-supported, air-inflated, or tensioned membrane) that is subdivided into rooms, rooms with areas that are sub-dividable into smaller separate rooms, with occupancy loads of 50 or more persons, shall have room capacity signs posted by the main exit for each separate room in addition to the main room sign.

22.14.3 Sign Construction

Occupancy capacity signs shall be constructed of durable materials, with minimum of 1-inch block letters and numbers, on a contrasting background so as to be readily visible. The number of occupants permitted for each room use and the room identification for each separate room area (where provided) shall be included on the sign. (See Figure 22.14.3 below.)

22.14.4 Sign Placement.

The occupancy capacity sign shall be located in a conspicuous location not obstructed by doors, curtains, poster board stands, furniture, room dividers, or similar items. The sign shall be posted not more than 60 inches or less than 48 inches above the floor.

22.14.5 Sign Maintenance.

The owner of the tent, canopy, or membrane structure (air supported, air-inflated, or tensioned membrane) or the owner's authorized agent shall maintain all occupancy signs to be legible.

Figure 22.14.3:

Sign Example: (Reference: current edition of the *Fire Code*)

Large lettering shall be a minimum of 1-inch in height.

Small lettering shall be a minimum of 3/8-inch in height.



Appendix A – Egress Requirements for Tents and Canopies

Table 22.8 – Minimum Number of Means of Egress (and Means of Egress Widths) from Tents, Canopies and Temporary Membrane Structures.

Occupant Load	Minimum Number of Means of Egress	Tent or Canopy Minimum Width of Each Means of Egress (Inches)	Membrane Structure Minimum Width of Each Means of Egress (Inches)
10 – 199	2	72	36
200 – 499	3	72	72
500 – 999	4	96	72
1,000 – 1,999	5	120	96
2,000 – 2,999	6	120	96
Over 3,000 ^a	7	120	96

- a. When the occupant load exceeds 3,000, the total width of means of egress in inches shall not be less than the total occupant load multiplied by 0.2 inches per person.

References

1. City of Houston *Fire Code*.
2. City of Houston *Building Code*.
3. City of Houston *Electrical Code*.
4. City of Houston *Fuel Gas Code*.
5. National Fire Protection Association (NFPA) Standard 10, “Portable Fire Extinguishers.”
6. National Fire Protection Association (NFPA) Standard 701, “Methods of Fire Tests for Flame-Resistant Textiles and Films.”
7. Life Safety Bureau (LSB) Standard No. 01, “Installation and Maintenance of Portable Fire Extinguishers.”
8. Life Safety Bureau (LSB) Standard No. 10, “LP-Gas Storage and Use.”

All reference materials used under this Life Safety Bureau standard shall be in accordance with the most current adopted City of Houston *Construction Code*.