CHAPTER 31
TENTS AND OTHER MEMBRANE STRUCTURES

SECTION 3101
GENERAL

3101.1 Scope. Tent and membrane structures shall comply with this chapter. The provisions of Section 3103 are applicable only to temporary tents and membrane structures. The provisions of Section 3104 are applicable to temporary and permanent tents and membrane structures. Membrane structures covering water storage facilities, water clarifiers, water treatment plants, sewage treatment plants, greenhouses and similar facilities not used for human occupancy, are required to meet only the requirements of Section 3104.2.1.

SECTION 3102
DEFINITIONS

3102.1 Definitions. The following terms are defined in Chapter 2:

AIR-INFLATED STRUCTURE.
AIR-SUPPORTED STRUCTURE.
MEMBRANE STRUCTURE.
TEMPORARY STAGE CANOPY.
TENT.

SECTION 3103
TEMPORARY TENTS AND MEMBRANE STRUCTURES

3103.1 General. Tents and membrane structures used for temporary periods shall comply with this section. Other temporary structures erected for a period of 180 days or less shall comply with the International Building Code.

3103.2 Approval required. Tents and membrane structures having an area in excess of 400 square feet (37 m²) shall not be erected, operated or maintained for any purpose without obtaining approval from the fire official.

Exceptions:

1. Tents used exclusively for recreational camping purposes.
2. Tents open on all sides which comply with all of the following:
   2.1. Individual tents having a maximum size of 700 square feet (65 m²).
   2.2. The aggregate area of multiple tents placed side by side without a fire break clearance of 12 feet (3658 mm), not exceeding 700 square feet (65 m²) total.
   2.3. A minimum clearance of 12 feet (3658 mm) to all other structures and tents.
3. Tents 900 square feet (84 m²) and smaller in total area when occupied by fewer than 50 persons, which have no heating appliances, no installed electrical service and are erected for fewer than 72 hours.

3103.3 Place of assembly. For the purposes of this chapter, a place of assembly shall include a circus, carnival, tent show, theater, skating rink, dance hall or other place of assembly in or under which persons gather for any purpose.

3103.4 Permits. Permits, if required, shall be in accordance with the Connecticut State Fire Prevention Code.

3103.5 Use period. Temporary, air-supported structures, air-inflated or tensioned membrane structures shall not be erected for a period of more than 180 consecutive calendar days out of any 365 consecutive calendar days on a single premise.

3103.6 Construction documents. A detailed site and floor plan for tents or membrane structures with an occupant load of 50 or more shall be provided with each application for approval. The tent or membrane structure floor plan shall indicate details of the means of egress facilities, seating capacity, arrangement of the seating and location and type of heating and electrical equipment.

3103.7 Inspections. The entire tent, air-supported, air-inflated or tensioned membrane structure system shall be inspected at regular intervals, but not less than two times per permit use period, by the permittee, owner or agent to determine that the installation is maintained in accordance with this chapter.

Exception: Permit use periods of less than 30 days.

3103.7.1 Inspection report. Where required by the fire code official, an inspection report shall be provided and shall consist of maintenance, anchors and fabric inspections.

3103.8 Access, location and parking. Access, location and parking for temporary tents and membrane structures shall be in accordance with this section.

3103.8.1 Access. Fire apparatus access roads shall be provided in accordance with Section 503.

3103.8.2 Location. Tents or membrane structures shall not be located within 20 feet (6096 mm) of lot lines, buildings, other tents or membrane structures, 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 membrane structure or tent.

Exceptions:

1. Separation distance between membrane structures and tents not used for cooking is not required where the aggregate floor area does not exceed 15,000 square feet (1394 m²).
2. Membrane structures or tents need not be separated from buildings when all of the following conditions are met:

2.1. The aggregate floor area of the membrane structure or tent shall not exceed 10,000 square feet (929 m²).

2.2. The aggregate floor area of the building and membrane structure or tent shall not exceed the allowable floor area including increases as indicated in the International Building Code.

2.3. Required means of egress are provided for both the building and the membrane structure or tent including travel distances.

2.4. Fire apparatus access roads are provided in accordance with Section 503.

3103.8.3 Location of structures in excess of 15,000 square feet in area. Membrane structures having an area of 15,000 square feet (1394 m²) or more shall be located not less than 50 feet (15 240 mm) from any other tent or structure as measured from the sidewalk of the tent or membrane structure unless joined together by a corridor.

3103.8.4 Membrane structures on buildings. Membrane structures that are erected on buildings, balconies, decks or other structures shall be regulated as permanent membrane structures in accordance with Section 3102 of the International Building Code.

3103.8.5 Connecting corridors. Tents or membrane structures 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 (3658 mm) wide.

3103.8.6 Fire break. An unobstructed fire break passageway or fire road not less than 12 feet (3658 mm) wide and free from guy ropes or other obstructions shall be maintained on all sides of all tents and membrane structures unless otherwise approved by the fire code official.

3103.9 Anchorage required. Tents or membrane structures and their appurtenances shall be adequately roped, braced and anchored to withstand the elements of weather and prevent against collapsing. Documentation of structural stability shall be furnished to the fire code official on request.

3103.9.1 Tents and membrane structures exceeding one story. Tents and membrane structures exceeding one story shall be designed and constructed to comply with Chapter 16 of the International Building Code.

3103.10 Temporary air-supported and air-inflated membrane structures. Temporary air-supported and air-inflated membrane structures shall be in accordance with Sections 3103.10.1 through 3103.10.4.

3103.10.1 Door operation. During high winds exceeding 50 miles per hour (22 m/s) or in snow conditions, the use of doors in air-supported structures shall be controlled to avoid excessive air loss. Doors shall not be left open.

3103.10.2 Fabric envelope design and construction. Air-supported and air-inflated structures shall have the design and construction of the fabric envelope and the method of anchoring in accordance with Architectural Fabric Structures Institute ASI 77.

3103.10.3 Blowers. An air-supported structure used as a place of assembly shall be furnished with not less than two blowers, each of which has adequate capacity to maintain full inflation pressure with normal leakage. The design of the blower shall be so as to provide integral limiting pressure at the design pressure specified by the manufacturer.

3103.10.4 Auxiliary inflation systems. Places of public assembly for more than 200 persons shall be furnished with an auxiliary inflation system capable of powering a blower with the capacity to maintain full inflation pressure with normal leakage in accordance with Section 3103.10.3 for a minimum duration of 4 hours. The auxiliary inflation system shall be either a fully automatic auxiliary engine-generator set or a supplementary blower powered by an internal combustion engine that shall be automatic in operation. The system shall be capable of automatically operating the required blowers at full power within 60 seconds of a commercial power failure.

3103.11 Seating arrangements. Seating in tents or membrane structures shall be in accordance with Chapter 10.

3103.12 Means of egress. Means of egress for temporary tents and membrane structures shall be in accordance with Sections 3103.12.1 through 3103.12.8.

3103.12.1 Distribution. Exits shall be spaced at approximately equal intervals around the perimeter of the tent or membrane structure, and shall be located such that all points are 100 feet (30 480 mm) or less from an exit.

3103.12.2 Number. Tents, or membrane structures or a usable portion thereof shall have not less than one exit and not less than the number of exits required by Table 3103.12.2. The total width of means of egress in inches (mm) shall be not less than the total occupant load served by a means of egress multiplied by 0.2 inches (5 mm) per person.

3103.12.3 Exit openings from tents. 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 not less than 80 inches (2032 mm) 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 contrasts with the color of the tent.

3103.12.4 Doors. Exit doors shall swing in the direction of exit travel. To avoid hazardous air and pressure loss in air-supported membrane structures, such doors shall be automatic closing against operating pressures. Opening force at the door edge shall not exceed 15 pounds (66 N).
TABLE 3103.12.2
MINIMUM NUMBER OF MEANS OF EGRESS AND MEANS OF EGRESS WIDTHS FROM TEMPORARY MEMBRANE STRUCTURES AND TENTS

<table>
<thead>
<tr>
<th>OCCUPANT LOAD</th>
<th>MINIMUM NUMBER OF MEANS OF EGRESS</th>
<th>MINIMUM WIDTH OF EACH MEANS OF EGRESS (inches)</th>
<th>MINIMUM WIDTH OF EACH MEANS OF EGRESS (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tent</td>
<td>Membrane Structure</td>
<td></td>
</tr>
<tr>
<td>10 to 199</td>
<td>2</td>
<td>72</td>
<td>36</td>
</tr>
<tr>
<td>200 to 499</td>
<td>3</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>500 to 999</td>
<td>4</td>
<td>96</td>
<td>72</td>
</tr>
<tr>
<td>1,000 to 1,999</td>
<td>5</td>
<td>120</td>
<td>96</td>
</tr>
<tr>
<td>2,000 to 2,999</td>
<td>6</td>
<td>120</td>
<td>96</td>
</tr>
<tr>
<td>Over 3,000*</td>
<td>7</td>
<td>120</td>
<td>96</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm.

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

3103.12.5 Aisle. 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 (610 mm) but not less than the width required by the number of employees served.

2. In public areas, smooth-surfaced, unobstructed aisles having a minimum width of not less than 44 inches (1118 mm) shall be provided from seating areas, and aisles shall be progressively increased in width to provide, at 1 point, not less than 1 foot (305 mm) of aisle width for each 50 persons served by such aisle at that point.

3103.12.5.1 Arrangement and maintenance. The arrangement of aisles shall be subject to approval by the fire code official and shall be maintained clear at all times during occupancy.

3103.12.6 Exit signs. Exit signs shall be clearly marked. Exit signs shall be installed at required exit doorways and where otherwise necessary to indicate clearly the direction of egress where the exit serves an occupant load of 50 or more.

3103.12.6.1 Exit sign illumination. Exit signs shall be either listed and labeled in accordance with UL 924 as the internally illuminated type and used in accordance with the listing or shall be externally illuminated by luminaires supplied in either of the following manners:

1. Two separate circuits, one of which shall be separate from all other circuits, for occupant loads of 300 or less.

2. Two separate sources of power, one of which shall be an approved emergency system, shall be provided where the occupant load exceeds 300. Emergency systems shall be supplied from storage batteries or from the on-site generator set, and the system shall be installed in accordance with NFPA 70. The emergency system provided shall have a minimum duration of 90 minutes when operated at full design demand.

3103.12.7 Means of egress illumination. Means of egress shall be illuminated with light having an intensity of not less than 1 foot candle (11 lux) at floor level while the structure is occupied. Fixtures required for means of egress illumination shall be supplied from a separate circuit or source of power.

3103.12.8 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 less than 8 feet (2438 mm). The surface of means of egress shall be maintained in an approved manner.

3103.12.9 Protections of tent stakes. Tent stakes adjacent to any means of egress from any tent open to the public shall be railed off, capped, or covered so as not to present a hazard to the public.

SECTION 3104
TEMPORARY AND PERMANENT TENTS AND MEMBRANE STRUCTURES

3104.1 General. Tents and membrane structures, both temporary and permanent, shall be in accordance with this section. Permanent tents and membrane structures shall also comply with the International Building Code.

3104.2 Flame propagation performance treatment. Before a permit is granted, the owner or agent shall file with the fire code official a certificate executed by an approved testing laboratory certifying that the tents and membrane structures and their appurtenances; sidewalls, drops and tarpaulins; floor coverings, bunting and combustible decorative materials and effects, including sawdust where used on floors or passageways, are composed of material meeting the flame propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701 or shall be treated with a flame retardant in an approved manner and meet the flame propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701, and that such flame propagation performance criteria are effective for the period specified by the permit.
3104.2.1 Membrane and interior liner material. Membranes and interior liners shall be either noncombustible as set forth in Section 703.5 of the International Building Code or meet the fire propagation performance criteria of NFPA 701 and the manufacturer's test protocol.

Exception: Plastic less than 20 mil (0.5 mm) in thickness used in greenhouses, where occupancy by the general public is not authorized, and for aquaculture pond covers is not required to meet the fire propagation performance criteria of NFPA 701.

3104.3 Label. Membrane structures or tents shall have a permanently affixed label bearing the identification of size and fabric or material type.

3104.4 Certification. An affidavit or affirmation shall be submitted to the fire code official and a copy retained on the premises on which the tent or air-supported structure is located. The affidavit shall attest to all of the following information relative to the flame propagation performance criteria of the fabric:

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

3104.5 Combustible materials. Hay, straw, shavings or similar combustible materials shall not be located within any tent or membrane structure containing an assembly occupancy, except the materials necessary for the daily feeding and care of animals. Sawdust and shavings utilized for a public performance or exhibit shall not be prohibited provided the sawdust and shavings are kept damp. Combustible materials shall not be permitted under stands or seats at any time.

3104.6 Smoking. Smoking shall not be permitted in tents or membrane structures. Approved "No Smoking" signs shall be conspicuously posted.

3104.7 Open or exposed flame. Open flame or other devices emitting flame, fire or heat or any flammable or combustible liquids, gas, charcoal or other cooking device or any other unapproved devices shall not be permitted inside or located within 20 feet (6096 mm) of the tent or membrane structures while open to the public unless approved by the fire code official.

3104.8 Fireworks. Fireworks shall not be used within 100 feet (30 480 mm) of tents or membrane structures.

3104.9 Spot lighting. Spot or effect lighting shall only be by electricity, and all combustible construction located within 6 feet (1829 mm) of such equipment shall be protected with approved noncombustible insulation not less than 9/4 inches (235 mm) thick.

3104.10 Safety film. Motion pictures shall not be displayed in tents or membrane structures unless the motion picture film is safety film.

3104.11 Clearance. There shall be a minimum clearance of at least 3 feet (914 mm) between the fabric envelope and all contents located inside membrane structures.

3104.12 Portable fire extinguishers. Portable fire extinguishers shall be provided as required by Section 906.

3104.13 Fire protection equipment. Fire hose lines, water supplies and other auxiliary fire equipment shall be maintained at the site in such numbers and sizes as required by the fire code official.

3104.14 Occupant load factors. The occupant load allowed in an assembly structure, or portion thereof, shall be determined in accordance with Chapter 10.

3104.15 Heating and cooking equipment. Heating and cooking equipment shall be in accordance with Sections 3104.15.1 through 3104.15.7.

3104.15.1 Installation. Heating or cooking equipment, tanks, piping, hoses, fittings, valves, tubing and other related components shall be installed as specified in the International Mechanical Code and the International Fuel Gas Code, and shall be approved by the fire code official.

3104.15.2 Venting. Gas, liquid and solid fuel-burning equipment designed to be vented shall be vented to the outside air as specified in the International Fuel Gas Code and the International Mechanical Code. Such vents shall be equipped with approved spark arresters where required. Where vents or flues are used, all portions of the vent or membrane structure shall not be less than 12 inches (305 mm) from the flue or vent.

3104.15.3 Location. Cooking and heating equipment shall not be located within 10 feet (3048 mm) of exits or combustible materials.

3104.15.4 Operations. Operations such as warming of foods, cooking demonstrations and similar operations that use solid flammables, butane or other similar devices that do not pose an ignition hazard, shall be approved.

3104.15.5 Cooking tents. Tents with sidewalls or roofs where cooking is performed shall be separated from other tents or membrane structures by not less than 2 feet (6096 mm).

3104.15.6 Outdoor cooking. Outdoor cooking that produces sparks shall not be performed within 20 feet (6096 mm) of a tent or membrane structure or shall be as approved by the fire code official.

3104.15.7 Electrical heating and cooking equipment. Electrical cooking and heating equipment shall comply with NFPA 70.

3104.16 LP-gas. The storage, handling and use of LP-gas and LP-gas equipment shall be in accordance with Sections 3104.16.1 through 3104.16.3.

3104.16.1 General. LP-gas equipment such as tanks, piping, hoses, fittings, valves, tubing and other related components shall be approved and in accordance with Chapter 61 and with the International Fuel Gas Code.
occupied by a tent or membrane structure, and from areas
within 30 feet (9144 mm) of such structures.

3104.22 Combustible waste material. The floor surface
inside tents or membrane structures and the grounds outside
and within a 30-foot (9144 mm) perimeter shall be kept free
of combustible waste and other combustible materials that
could create a fire hazard. Such waste shall be stored in
approved containers and removed from the premises not less
than once a day during the period the structure is occupied by
the public.

SECTION 3105
TEMPORARY STAGE CANOPIES

3105.1 General. Temporary stage canopies shall comply
with Section 3104, Sections 3105.2 through 3105.8 and ANSI
E1.21.

3105.2 Approval. Temporary stage canopies in excess of 400
square feet (37 m²) shall not be erected, operated or main-
tained for any purpose without first obtaining approval and a
permit from the fire code official and the building official.

3105.3 Permits. Permits, if required, shall be in accordance
with the Connecticut State Fire Prevention Code.

3105.4 Use period. Temporary stage canopies shall not be
erected for a period of more than 45 days.

3105.5 Required documents. The following documents
shall be submitted to the fire code official and the building
official for review before a permit is approved:

1. Construction documents: Construction documents shall
be prepared in accordance with the International Build-
ing Code by a registered design professional. Construc-
tion documents shall include:

1.1. A summary sheet showing the building code
used, design criteria, loads and support reac-
tions.

1.2. Detailed construction and installation drawings.

1.3. Design calculations.

1.4. Operating limits of the structure explicitly out-
lined by the registered design professional
including environmental conditions and physi-
cal forces.

1.5. Effects of additive elements such as video
walls, supported scenery, audio equipment, ver-
tical and horizontal coverings.

1.6. Means for adequate stability including specific
requirements for guying and cross-bracing,
ground anchors or ballast for different ground
conditions.

2. Designation of responsible party: The owner of the
temporary stage canopy shall designate in writing a
person to have responsibility for the temporary stage
canopy on the site. The designated person shall have
sufficient knowledge of the construction documents,
manufacturer's recommendations and operations plan
to make judgments regarding the structure's safety and
to coordinate with the fire code official.

3. Operations plan: The operations plan shall reflect man-
ufacturer's operational guidelines, procedures for envi-
rmental monitoring and actions to be taken under
specified conditions consistent with the construction
documents.

3105.6 Inspections. Inspections shall comply with Section
106 and Sections 3105.6.1 and 3105.6.2.

3105.6.1 Independent inspector. The owner of a tempo-
rary stage canopy shall employ a qualified, independ-
ent approved agency or individual to inspect the installation of
a temporary stage canopy.

3105.6.2 Inspection report. The inspecting agency or
individual shall furnish an inspection report to the fire
code official. The inspection report shall indicate that
the temporary stage canopy was inspected and was or was not
installed in accordance with the approved construction
documents. Discrepancies shall be brought to the imme-
diate attention of the installer for correction. Where any dis-
crepancy is not corrected, it shall be brought to the atten-
tion of the fire code official and the designated
responsible party.

3105.7 Means of egress. The means of egress for temporary
stage canopies shall comply with Chapter 10.

3105.8 Location. Temporary stage canopies shall be located
a distance from property lines and buildings to accommodate
distances indicated in the construction drawings for guy
wires, cross-bracing, ground anchors or ballast. Location
shall not interfere with egress from a building or encroach on
fire apparatus access roads.