Use and Set-Up of Large Tents

ACTSAFE SAFETY BULLETIN #15

This bulletin describes safety guidelines for using and setting up large tents. Large tents are generally considered to be marquee, maxi-frame, super-frame, or SaddleSpan tents that are at least 20 ft. x 20 ft. (400 sq. ft.) in size and that require assembly on site.

HAZARDS

When planning any activity where there will be a tent occupied by people, the first step is to conduct a risk assessment, which will help identify how much space you need. A risk assessment will also help identify hazards and the risks associated with them. Here are some things to consider:

- **Flammables** (e.g., hair, makeup, and costumes) — Hair spray and makeup brush cleaner contain butane and alcohol, which are both flammable. Costumes may include flammable cellulose fibres, such as cotton, linen, or viscose.
- **Fire** — Tents don't have fire compartments to keep fires from spreading, so it's important to consider the stability, resistance, and fire reaction of tent materials.
- **Surface grade and composition** — Hills and uneven surfaces can present slope hazards. Parking lots can make staking difficult. On asphalt surfaces, weights used to hold down tents can shift in windy conditions.
- **Overhead obstructions** (e.g., power lines, telephone lines, exterior lighting sources, trees)
- **Underground lines** (e.g., electrical, gas, and irrigation lines) — When staking large tents, workers often use impact tools to drive in the stakes, which can potentially rupture an underground line and result in a fire, power outage, or flooding.
- **Weather** (e.g., windstorms, heavy snowfalls) — Approximately 70% of tent claims are weather related. High winds can damage or catch tents. Snow load is a major concern for tent collapse.

CONTROL MEASURES — TENT SELECTION, USE, AND PLACEMENT

When selecting a tent, consider the following:

- How the tent will be used (e.g., production, performance, or other purpose).
- How long it will be used for.
- Whether or not the jurisdiction will require a permit to put up a tent.
- Marquee, maxi-frame, SaddleSpan, and other tents must have certification tags clearly visible on them meeting the industry standard NFPA 701, CPAI- 84, which tent users will recognize as the California Code.
- Check for underground utilities so tent anchor pins won't contact electrical, gas, or irrigation lines. Have the property host mark underground lines before you set up. Note the depth of the lines.
- Check for overhead obstructions such as power lines, telephone lines, and trees.
- Check weather forecasts. If conditions become severe enough that the tent or temporary structure should not be used as shelter, it must be evacuated immediately. The wind-velocity rating of the structure should be available from the manufacturer. Snow must be removed from the roof regularly. Metal structures should be protected against lightning.
- Evaluate the ground that you are placing a tent on (topography). A field will likely be easier to drive stakes into, while a parking lot may be harder. Solid, flat ground is generally safer for erecting a tent.
- Follow the manufacturer's instructions and specifications for anchoring the tent. Note that

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some jurisdictions have specific requirements for the anchoring weight, which may differ from the manufacturer's instructions.

- To prevent fires, make sure electrical installations, heating, lighting, and other entertainment equipment are placed and used safely. Keep entrances and emergency exits clear of obstructions, and make sure the space between seats is big enough to allow for evacuation.
- Check the tent's condition. If there are signs of mould or damage, do not use the tent. Return and report it to the owner or rental company so it can be cleaned, repaired, or replaced.

Remember to add space for specialized activities and consider details such as the location, availability of electricity, and fuelling logistics. For example, if you plan to seat guests at eight-foot banquet tables (eight people per table), plan on 80 sq. ft. per table. Allow additional space for specialized activities such as costume storage, food preparation, or book signings.

Maximum occupancies for seating

The following table shows suggested maximum seating occupancies for frame tents and pole tents.

Frame tents consist of aluminum or steel pipes and fittings. They're assembled from the ground up. These freestanding tents do not require any centre poles or stakes.

Pole tents are held up with centre poles and side poles. They're covered with a top that is held in place with ratchet straps on the outside of the tent. These straps are attached to long stakes that are driven into the ground.

Note: This table is just a guideline. Regardless of what's specified in the table, building and occupancy codes, bylaws or regulations will vary for different jurisdictions, and local jurisdictions will override this guideline.

Tent size	Sq. ft.	Theatre-style seating	Rectangular-table seating
FRAME			
10 x 10	100		
10 x 15	150		
10 x 20	200		
15 x 15	225	40	N/A
15 x 20	300	50	28
20 x 20	400	80	48
20 x 30	600	120	80
20 x 45	900	140	96
20 x 60	1200	200	150
40 x 40	1600	320	224
40 x 60	2400	450	344
40 x 80	3200	640	385
POLE			
40 x 40	1600	320	224
40 x 60	2400	450	344
40 x 80	3200	640	385

HEATING

In the performing arts industry, the most commonly used types of heaters are electrical, forced air, and direct-fire propane. Whatever heat source you're using, read and follow the manufacturer's recommendations at all times.

Electrical

Electrical heaters do not give off any exhaust, so this eliminates the risk of carbon-monoxide poisoning. However, the heaters can be an ignition source if flammables are present.

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Forced air with ducting

There are two types of forced-air units in common use. One runs on diesel, propane, liquified natural gas or kerosene, with an electric fan. The unit is placed outside the tent and stack vented into the air, with ducting that may be run into the tent or building.

The other forced-air unit has a coil that is heated by electricity and an electric fan to blow the warmed air where required. The entire unit is sometimes placed directly inside the tent. Depending on the unit, the casing acts as an insulator, and the outside is not hot to the touch. When placing forced air outside a tent, consider the placement of the exhaust to minimize potential entry into the tent.

Direct-fire propane

Direct-fire propane heaters with single and double burners are often used in tents. It is important to ensure that it is safe to have an ignition source inside the tent, and adequate ventilation must be maintained. Two openings directly to the outdoors must be provided, one high and one low, on opposite sides of the area to be heated. Each opening must be at least 7.72 cm (3 in.) for every 1000 BTU. Therefore, for one 50,000 BTU heater, there must be two openings of at least .093 m2 (1 sq. ft.) at each end.

Note: These opening measurements are the legal minimum. When placing heaters in the tent, the best location is below the peak of the tent.

CONTROL MEASURES — HEATING

Consider the following controls for using heaters safely:

- Workers must be trained in the safe use of all heaters and must follow manufacturer's instructions.
- Manufacturer's instructions should be easily accessible for anyone working with or around propane.
- Defective or dysfunctional equipment should be taken out of service and returned to the owner for repair or replacement.
- When setting up portable propane heaters, keep them clear of entrances and exits. Ensure that all flaps are secure and/or out of the flammable range of the heater.
- Use carbon monoxide detectors in tents where there are direct-fired propane heaters or any combustible operation to help prevent accidental exposure to occupants. Never close the flaps unless there is adequate ventilation from above and below the tent walls. Carbon monoxide is a potentially deadly, colourless, odourless gas that is present in most exhaust. Carbon dioxide is also a product of combustion and respiration.
- When a rental company installs a tent, it is important to inspect all connections, anchor systems, and the positioning of the heaters to ensure they have been installed safely.
- Wall tents sold in Canada must be treated with a fire retardant rated to CPA1-84. Inspect the tents to ensure there is a label indicating the fire-retardant status/rating. Tents are only fire resistant, not fire proof.

Securing propane

All tanks must be secured to the ground or another stable object. Smaller tanks may be placed inside an empty, square milk carrier to ensure stability. Avoid attaching tanks to the tent. This can be dangerous if it's windy and the tent collapses or blows away.

Activities in tents

Direct-fired propane heaters or heaters with electrical elements should not be used in tents where there are other flammable aerosols, combustible gases, or airborne particulates (e.g., hair and makeup, paints, or glues) due to the risk of combustion. For tents where flammable products may be in use, consider using forced air heaters, units in which the ignition sources are outside of the tents and warm air is blown in via air ducts.

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Aisles

Aisles should be kept clear and made wide enough for safe evacuation in the event of an emergency.

Some tents have a strip of material on the bottoms of entrances and exits. These strips can be a tripping hazard. They should be secured, marked, or covered to prevent falls.

REGULATORY REFERENCES

- BC Safety Authority regulations require heating appliances to bear a current decal, valid for two years, applied by a gas fitter certifying its safety and operation.
- Smoking is prohibited inside tents as per section 4.81 of the Occupational Health and Safety Regulation.

Fire extinguishers

National Fire Protection Association (NFPA) regulations require tents to have a minimum Class A fire extinguisher available, and a B or C, depending on activities and size. It's a good idea to have an ABC extinguisher available in tents to ensure that minimums are met, regardless of activities taking place.

Maximum distances:

- Class A fire extinguisher — 22.86 m (75 ft.)
- Class B fire extinguisher — 9.14 m (30 ft.) or 15.24 m (50 ft.), depending on the type of hazard (low, moderate, or high) and the extinguisher rating

Source: NFPA 10, 2002 edition Table 5.3.1

RELATED RESOURCES

- Performing Arts Safety Bulletin #12 — Safe Set-Up and Use of Small Tents (for tents up to 60 m^2 or 645 ft.)
- Actsafe Fact Sheet #11 — Propane Guidelines
- Actsafe's Powerline Distance Requirements

Actsafe Safety Association

Actsafe (www.actsafe.ca) is a not-for-profit health and safety association supporting British Columbia's arts and entertainment industries. Actsafe provides resources and training to employers, workers, and supervisors. We are always here to provide information relevant to best practices around health and safety in the arts and entertainment industries in B.C.