

Fire prevention in large tents

CFPA-E Guideline No 36:2017 F





FOREWORD

The European Fire Protection Associations produce common guidelines in order to achieve similar interpretation in European countries and to provide examples of acceptable fire prevention and protective measures. CFPA Europe also develops and ratifies guidelines for aspects of natural hazards, safety and security related problems.

CFPA Europe's objective is to improve safety and security, and to prevent casualties, destruction of property and disruption of business activities. CFPA Europe also seeks to meet the increasing demands for quality and safety in the workplace.

A fire in a large tent or temporary structure made from textile with a large occupancy could have dramatic consequences. Such structures characteristically have poor fire resistance and due to the lack of fire compartments, smoke and flames can easily spread.

The purpose of this guideline is to assist safety practitioners in the development of fire safety measures and to ensure the safety of people in large tent(s) and marquees used for shows, circuses, trade fairs, exhibitions, etc.

This guideline is based on a Belgian publication. The proposal was developed by Jeanine Driessens from ANPI.

The Guideline has been compiled by the Guidelines Commission and adopted by all fire protection associations in the Confederation of Fire Protection Associations Europe.

These guidelines contain best practices developed by the members of CFPA Europe. If the guidelines and national requirements contradict, the national requirements must take precedence.

Copenhagen, 13 February 2017
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A small incident in a temporary light textile structure could have dramatic consequences. In a tent, there are no fire compartments to keep a fire from spreading and to buy time for people to escape. Therefore we must be particularly attentive to the following characteristics of the chosen materials: stability, resistance and fire reaction. We must constantly ensure the safety of electrical installations, heating, lighting or entertainment equipment. The entranceways and emergency exits have to stay clear of obstructions and the space between seats has to be big enough to permit evacuation whilst in panic or confusion.

Fire brigades are often entrusted with the task to advise the authorities about the organisation and security of public events in temporary structures. Similarly, employers organising a corporate event should ensure the safety of participants. This document should assist them with these tasks.

Note:

This guideline concerns fire safety, but the organiser should take into account all safety aspects. These include: stability, climatic conditions likely to cause a tent to fall or collapse (violent winds, heavy rain, snow), and the movements of the crowd, etc.

Keywords: Tent, temporary structure, exhibitions, crowds, occupancy, grandstands, stalls, cooking appliances, heating devices, access, emergency exits



1 Objectives and definitions

1.1 Objectives

The purpose of this guideline is to assist safety practitioners in the development of fire safety measures and to ensure the safety of people in large tent(s) and marquees used for shows, circuses, trade fairs, exhibitions, etc. with a large number of visitors/participants.

This guideline does not cover the housing of a large number of persons in an encampment or other temporary structures. The accommodation of such large groups in tents can generate aggravated risks when it comes to heating, cooking or lighting. The fire protection measures described in this guideline can be used as a starting point for the concerned authorities, but should absolutely be adapted to the specific situation at hand.

1.2 General remark

The measures proposed in this guideline should be analysed and adapted to the specific risks and activities. Whatever the case may be, any European, national or local regulation should be respected.

1.3 Definitions

This guideline concerns structures which, by design, are made - in whole or in part – with soft covers.

Temporary structure: a structure established for a maximum of six months.

Size: 50 m² and more.

Juxtaposed structures: Smaller structures separated by a distance of less than 8 m should be considered as one area.

2 Risk analysis

The organiser needs to carry out a risk analysis in advance and should take the appropriate safety measures. This analysis should involve all stakeholders (organisers, employees, local authorities, emergency services, police, medical staff and fire departments).

Events involving employees in any capacity are subject to the regulations concerning safety at work: the employer needs to prepare a risk analysis.



3 Control and inspection

3.1 Required inspection and maintenance

Before opening to the public, the structure and its equipment should be subject to an authorization of the local authorities on basis of a report of the security services (possibly fire departments). The organiser has reports of the inspection bodies accredited for the type of equipment concerned.

Examples of recommended inspections and approvals of technical equipment:

- Structural resistance of the frame and grandstands,
- Electric installation (among others: general and specific installation in booths, lighting, emergency lighting),
- Lightning rods and protection,
- Heating and cooking installations,
- Approved gas cylinders, fire extinguishers
- Etc.

The organiser should be able to prove that the devices and equipment are in good condition. The maintenance of the structure and equipment should only be conducted by authorized personnel in accordance with the standards and/or instructions of the manufacturers.

3.2 Safety documentation

The organiser must be able to submit the required documents at any time to the authorities and emergency services. All documents should be gathered in a single file.¹

Examples:

- Plans and maps of the location,
- Certification of the materials "reaction to fire" as required (cover, seats, partitions, decoration, etc.),
- Certification/calculations of structural resistance to wind, rain, snow,
- Emergency plans and procedures with contact details of the people in charge,
- Datasheets and technical manuals of the different pieces of equipment,
- Datasheets of chemical products,
- Technical required inspections certificates (e.g. grandstands, energy and heat producing equipment such as electric installations, and heating and cooking equipment),
- Periodic certificates or reports of inspection and maintenance of the various equipment and materials,
- Emergency and evacuation procedures

¹ Also see the CFPA-E Guideline No 13:2015 F *Fire protection documentation*



4 Concerning the location

The structure should be located in an area free of particular risks and at a safe distance from other buildings, facilities and plantations.

The layout of the site must be arranged in a well-ordered manner, so that the emergency exits and entranceways are free for emergency vehicles and the public.

4.1 Access to the event/structure

The access road(s) and entranceways to the event should remain free of obstructions.

The access roads should be accessible to fire trucks and other emergency vehicles, and have to be connected to at least half the circumference of the structure.

The number of access roads has to be determined in function of the expected maximum occupancy.

The organisation has to reserve enough space for manoeuvring emergency vehicles.

4.2 Internal roads

On site, passageways and alleys around the tents should remain free at all times.

Parking of vehicles close to the structures should be prohibited.

4.3 Specific locations

Certain specific locations should be approved by the authorities and the security services.
Examples:

- Next to a building
- On the terrace of a building
- In a closed area

All locations must at least meet the following requirements:

- Emergency services have easy access to the building and the tent;
- Sufficient evacuation possibilities for occupants of the surrounding buildings and tent;
- The bearing capacity of the building supports the overload of the tent;
- There are enough emergency exits and the width of each exit is sufficient.
- The sound alarm (emergency signals) is audible in the tent and the building(s).



5 CONSTRUCTION

The stability of the temporary structure should be certified by a qualified agency or an engineer experienced in this field.

All structures must be anchored to the ground.

5.1 Resistance to wind and weather

The organiser should possess research data concerning the limitations of the structure (and its material/equipment) regarding certain weather conditions, such as wind², snow loads and rains³. If the weather conditions exceed the limitations, the public needs to be evacuated. Similarly, access should be denied in exceptional climatic circumstances that could endanger public safety.

5.2 Framework and covering

5.2.1 Rigid Frame

In case of subsidence or a collapse of the covering, the rigid frame that supports the structure should allow the occupants enough free space to escape.

5.2.2 Covering

Easily inflammable materials and components should be prohibited. The best possible fire endurance class is recommended.

6 ISSUES AND EMERGENCY EXITS

6.1 Number of visitors

Because it is particularly important to know the right number of occupants/visitors on a site/at an event, it is recommended to introduce a system to count the entries.

In any case, the maximum authorized occupancy (maximum number of visitors at the same time on site or in the tent) may not be exceeded.

In order to keep track of the amount of occupants, one can use different techniques depending on the scheduled assistance:

- Admission tickets,
- Automatic counting,
- Electronic passes,
- Etc.

² CFPA-E Guideline No 3:2013 N *Protection of buildings against wind damage*

³ CFPA-E Guideline No 5:2014 N *Managing heavy snow loads on roofs*



6.2 Exits

The number of required (emergency) exits is based on the total allowed occupancy (maximum occupancy expected).

6.2.1 Number and width

The location, distribution and width of exits and pathways should assure a quick and easy escape to a secure area.

Minimum height: 2 m

Minimum width: 1.20 m

Number of exits: in accordance with occupancy. It is recommended to have at least two.

In case of a large occupancy (more than 500), the structure should have at least 3 exits + 1 exit for every 500 extra visitors.

The exits should lead to different escape routes.

6.2.2 Emergency exits

Emergency exits have to be easy to open with a single gesture, without locking systems in the direction of the evacuation.

The exits are clearly marked and are accessible at all times.

Loose strips/bands of the covering may be used as exits if they stay open during the occupation of the tent.

7 Roads and pathways at the site

7.1 Evacuation roads

From any point in the tent, occupants must be able to easily reach a safe place outside the tent.

It is forbidden to place obstacles or to drop objects that could impede the passage or reduce the useful evacuation width.

Maximum distance

The maximum distance to reach the outside of the structure should not exceed 30m. If the layout is complex, the distance should be limited to 20 m.

In tents where people can be affected by alcohol consumption, the walking distance should be reduced.

7.2 Evacuation

There should be enough free space near the exits in order to facilitate the movement of occupants.

Width of the free area = width of the exit.



Poles, tent pegs, and their fasteners are allowed in the axis of the exits, if they do not obstruct the evacuation roads.

The emergency exits should be marked from the outside and remain free.

7.3 Other pathways on site

It is forbidden to place obstacles or to drop any objects that could impede the movement of the people.

Moving parts or anything else that could be moved or knocked down, such as counters, bars, boxes, displays, podiums, etc. are prohibited in the passageways.

TRADE FAIRS AND EXHIBITIONS

The paths between the stalls should have a minimum width of 2 m.

The total capacity of the paths should be in accordance with the maximum expected capacity of the tent.

7.4 Stairs

Stairs should be of the "straight" type, with at least one handrail.

8 LAYOUT AND FITTINGS

8.1 Interior fittings

Fittings should not be moved and should never impede the movement of the public in the passageways.

8.2 Seats and grandstands

8.2.1 Seats

Seats should be fixed and arranged in rows to avoid being moved or overturned.

The seats can be secured by either:

- Individually fixing them to the ground
- Sorting and fixing them per row
- Securing multiple rows of seats together

The rows should be designed to facilitate the movement of the public.

The outer seats should be aligned without obstructing the movement of the public.



8.2.2 *Grandstands and bleachers*

Grandstands and bleachers should respect particular requirements in terms of stability, load and use.

They have to be divided into blocks of 10m, with passages between blocks.

8.2.3 *Seats in the stands*

The passages between rows should allow easy access and movement.

Example:

Distance between rows: 70 cm

Distance between seats: 50 cm

Passage between 2 rows: 30 cm (back/seat)

Seat depth: 40 cm

8.2.4 *Occupation*

The maximum occupancy allowed is determined by the number of seats, and - in absence of individual seats - by the rate of 1 person per 50 cm.

PERFORMANCE HALLS

The location of the seats and bleachers should meet local regulations for theatres.

8.3 Stalls

Partitions and decoration of stands should consist of moderately flammable materials.

Attention: The partitioning walls should be carefully placed so that there are no risks of them falling down.

TRADE FAIRS AND STANDS

Structures used in trade fairs or exhibitions often include alleys and stalls.

The organiser has to pay attention to hanging decorations, demonstrations and other equipment that may either ignite or produce flames or sparks.

General security measures (heating, lighting, cooking, etc.) should be respected in the stands.

8.4 Decoration

Drapes and other hanging decorations should be prohibited across and along the access roads and pathways.

Decorative objects or set-ups larger than 0.50 m², such as festoons and other lightweight decorative objects should be made of non-flammable materials.

8.5 Awnings

Awnings and other stretch ceilings should be designed and installed to avoid any risk of falling on the public. They have to be made out of fire-resistant materials.



8.6 Scenic facilities

Scenic facilities like curtains should be made of non-flammable materials.

9 TECHNICAL EQUIPMENT

9.1 Generalities

All appliances and equipment that produce energy or heat should be safe. They should comply with the regulations, and the stringent technical, installation, operation and maintenance standards.

They may cause neither obstruction nor danger.

They are protected to avoid any risk of accident and unauthorized use.

Arrangements should be made to prevent:

- overheating
- explosion
- fire
- intoxication
- etc.

The condition of the equipment should be regularly tested by a qualified person designated by the organiser.

All deficiencies should be immediately repaired by qualified personnel.

The staff in charge should be informed of the procedure regarding the usage, maintenance and safety devices of the equipment.

9.2 Heating equipment

Appliances with an open flame (or appliances that can produce one) or an open high-heated surface should not be placed or used inside the structure.

Combustion heat generators should be placed outdoors at a safe distance from the cover.

If closer, the covering should be protected by a non-combustible insulation screen.

9.3 Cooking appliances

Appliances with an open flame or a high temperature are not allowed inside of the structure.

However, "kitchen modules" or "food trucks" complying with all security measures can be authorised into structures assigned to catering or can be installed in a separate tent.

Even placed outdoors, these cooking devices should be placed at a safe distance from the cover. All devices are equipped with a stable, non-combustible and sufficiently large flame screen.



9.3.1 *About the "kitchen" modules*

The module should be:

- maintained at a minimum distance of 1 m from the covering or any other element of the structure
- easily accessible
- equipped with emergency tripping devices
- the interior walls and coatings are made in non-combustible materials
- the extraction duct should not be able to heat the covering
- the extraction duct should be regularly cleaned and maintained
- the module should be ventilated directly to the outside

The cooking zone should be equipped with easily accessible extinguishing means.

If these provisions are not met, the "kitchen" unit should be installed outdoors at a safe distance from the structure.

9.3.2 *About the use of barbecues*

Barbecues are prohibited inside the structure.

Even when placed outside, some safety measures should be strictly followed:

- Avoid the risk of turning over the hot coals
- Keep a safe distance between the structure and any combustible material
- Keep the public away from the cooking area (a free area of 3 m protected by barriers)
- Place the cooking area away from the public and passageways
- Be equipped with at least 1 means of fire extinction
- Ensure the extinction and the complete cooling of the embers before moving
- Permanent survey of the hot embers

9.3.3 *About deep fryers*

Deep fryers should be prohibited inside the structure.

In addition to the usual safety and prevention measures, fryers and oil containers should be:

- Stable without any possibility of falling
- Kept at a safe distance of the cover

The cooking areas should be:

- Located in a free cooking area protected by barriers
- Located outside the public passageways
- Equipped with at least 1 means of extinction

9.4 Electrical installation

The electrical installation should comply with the rules.

The electrical equipment has to be earthed.

The installation should be inspected by an accredited control organisation before occupation of the structure.



Electrical security appliances - if present – should function in the event of power cut-off supply. It concerns for example:

- Security lighting
- Warning and alarm systems
- Escape devices

9.5 Lighting

Only electrical lighting should be allowed.

The normal lighting should be provided by fixed or suspended luminaires.

Open flames or candles are forbidden.

9.6 Sound systems

Sound systems – if present - can be used for emergency messages.

If so, they should meet the technical criteria of functionality imposed on safety equipment and ensure among others:

- Reliability
- Audibility
- Priority given to the evacuation

9.7 Gas Cylinders

The gas supply should only be provided by butane/propane gas cylinders.

One gas bottle is allowed by gas appliance inside.

The remaining bottles should be securely stored outside.

Empty bottles should be stored separately.

9.8 Protection against lightning

Metal structures should be protected against lightning⁴.

9.9 Facilities for special effects

SHOWS AND EVENTS

Temporary structures are known to host various recreational and leisure activities that require special equipment providing special effects such as lighting, laser effects, smoke or foam, etc.

Smoke generators, laser projectors, sound mixers, etc. should be kept out of reach of the public.

Fireworks and similar pyrotechnic products should not be authorized without a specific risk assessment approved by the authorities.

⁴ CFPA E Guideline No 4 2013 N - Lightning protection



10 SAFETY SIGNS

The site should be equipped with safety signs in accordance with the regulations for safety and health at work (European Directive 92/58/EEC)⁵.

When there is little light or in dark spaces, safety signs should be lit or enhanced by a luminous or photo luminescent support.

11 FIRE ALARM AND FIRE FIGHTING

11.1 Calling fire departments

In case of fire, immediately call 112.

In the absence of a fixed telephone line, ensure the correct reception of the mobile telephone network.

11.2 Fire alarm

The evacuation alarm should be produced by an efficient and reliable sound system, eventually reinforced by a voice alarm according to TS EN 54-32.

Triggering the alarm should automatically stop other audio messages, the restoration of normal lighting and the activation of the emergency lighting – if present.

Emergency voice messages can be provided via:

- A portable device with a self-contained power source (e.g. megaphone),
- A sound-producing device equipped with a backup power supply operable in the event of failure of the normal power supply,
- A specially designed voice alarm system.

11.3 Fire extinguishing equipment

Appropriate extinguishing equipment is required.

It should be in good state, regularly maintained, protected against frost, easily accessible, judiciously distributed and signed posted.

The number and type of extinguishing agents are determined through the fire risk assessment and in consultation with the organiser, the authorities and the fire service.

Examples:

Passageways: 1 extinguisher every 20 m

Types: water spray with additive (6 l. min. foam) or AC powder (6 kg min.)

⁵ CFPA-E guideline n° 5 F Guidance signs, emergency lighting and general lighting



Booths and stands: 1 extinguisher 1 unity
Types: water spray with additive (foam) or ABC powder

In the vicinity of:

Electrical hazards (electrical panel - large appliances): 1 CO2 extinguisher (5 kg min.)

Heaters (oil): 1 ABC powder fire extinguisher (6 kg min. or water spray with additive (6 l. min. foam)

Cooking area: 1 ABC portable extinguisher (6 kg min.) or water spray with additive (6 l. min. foam)
+ 1 fire blanket

Barbecues: 1 ABC portable extinguisher (6 kg min.) or water spray with additive (6 l. min. foam) +
1 fire blanket

Fryers: 1 fire extinguisher type F + 1 fire blanket

11.4 Public fire hydrants and water supply

High occupancy structures should be located nearby a hydrant.

If not, the organiser has to consider other hydraulic means in consultation with the authorities and the authorized fire department.

12 INTERNAL ORGANISATION

12.1 Guidelines and emergency procedures

Emergency procedures and instructions are required.

Procedures, plans and lists of people in charge are collected in the safety map of the organisation and are made available to the authorities and emergency services (see 3.2)⁶.

12.1.1 Evacuation procedure

The evacuation procedure should explain how to bring the occupants (public and staff) to safety.

It should best take into account the possible scenarios depending on the:

- Location of the fire or the emergency
- Origin of the danger
- Structure involved
- People involved
- Best safe "meeting" place available

12.2 Information for staff and exhibitors

All staff, operators and exhibitors should be informed of safety and emergency procedures.

⁶ More information about fire safety management –AE Guideline n°1 Fire protection management system



12.3 The role of organisers and staff

12.3.1 *The fire safety coordinator*

In organizations with over 250 people, a responsible person⁷ should be able to organize and coordinate the various aspects of fire safety.

12.3.2 *Evacuation stewards*

In temporary structures, stewards⁸ play a major role in case of an emergency. They assist the public to escape and guide them to a safe place without hampering the rescue operation.

12.3.3 *First intervention team*

Based on the risk analysis, the authorities may require the presence on-site of a fire warden⁹, especially assigned to the fire prevention.

12.4 Public fire brigade

The authorities can demand the presence of the public fire brigade during the event.

13 FIRE PREVENTION MEASURES

Below are examples of some of the main prevention measures that an organiser should apply.

This list is not exhaustive.

13.1 Smoking ban

It is forbidden to smoke inside the structures.

The organiser should extend this ban to all areas with a risk of fire - even outside - such as near:

- Gas cylinders storage,
- Highly flammable and combustible products such as hay bales or carton boxes,
- Dry vegetation,
- Etc.

Enough ashtrays should be available in the authorized "smoking spaces".

13.2 Open flames

It is forbidden to make and use open flames inside the structure or near the cover.

⁷ CFPA-E Guideline No 11 2015 Recommended Numbers of Fire Protection Trained Staff

⁸ CFPA-E Guideline No 11 2015 Recommended Numbers of Fire Protection Trained Staff

⁹ CFPA-E Guideline No 11 2015 Recommended Numbers of Fire Protection Trained Staf



13.3 Use of fireworks

The use of fireworks and pyrotechnic products should be prohibited inside the structures. Outside, special security measures should be considered.

13.4 Hazardous products

It is forbidden to produce, use or store flammable, toxic, irritating or corrosive products on site. Examples: balloons inflated with flammable gas, cooking appliances with ethanol, etc.

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- Guideline No. 1:2012 N - Protection against flood
- Guideline No. 2:2013 N - Business Resilience – An introduction to protecting your business
- Guideline No. 3:2013 N - Protection of buildings against wind damage
- Guideline No. 4:2013 N - Lightning protection
- Guideline No. 5:2014 N - Managing heavy snow loads on roofs
- Guideline No. 6:2015 N - Forest fires



Security

- Guideline No. 1:2010 S - Arson document
- Guideline No. 2:2010 S - Protection of empty buildings
- Guideline No. 3:2010 S - Security system for empty buildings
- Guideline No. 4:2010 S - Guidance on key holder selections and duties
- Guideline No. 5:2012 S - Security guidelines for museums and showrooms
- Guideline No. 6:2014 S - Emergency exit doors in non-residential premises