Fire safety

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Contact us

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We support partners before, during and after the implementation of our shelters.

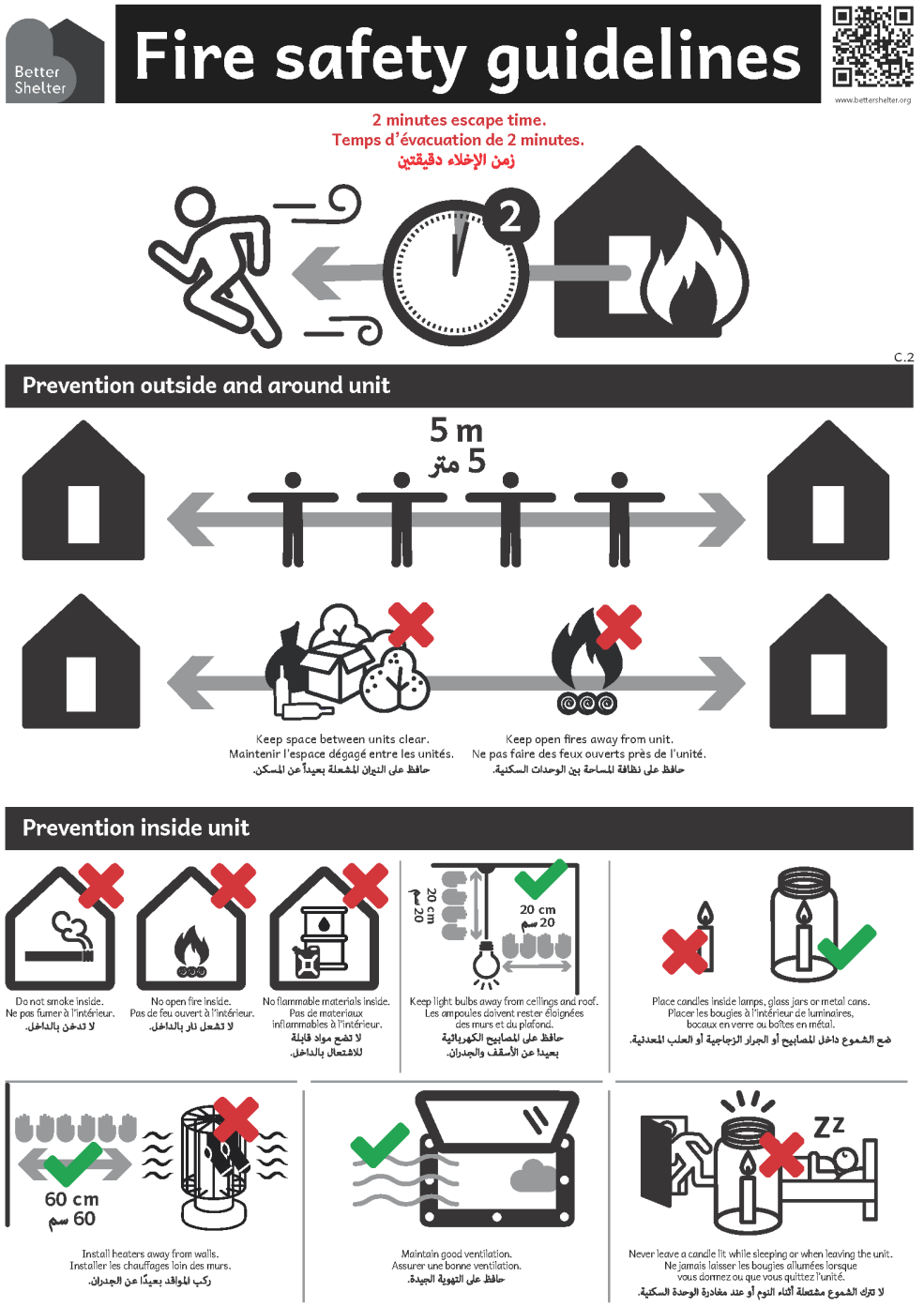
Apart from technical support, we offer consultations on how you can adapt our shelters to meet your specific needs.

If you notice any inconsistencies in the content of this document or have any suggestions, please reach out.

Fire safety and use

Each shelter has a sticker with fire safety guidelines to inform users about what to do and what not to do to prevent a fire or in case of a fire.

Language: English, French and Arabic



Why is fire protection in humanitarian settlements important?

Settlements for displaced people are at risk of fires due to several factors:

- Overcrowded temporary structures and camps.
- Unsafe cooking and heating appliances or open fires.
- Inability to provide constant childhood supervision.

Fire prevention and control measures are crucial in camps with increased risks and vulnerabilities.

Source: Kazeroonia, Y et al., 'Fires in refugee and displaced persons settlements: the current situation and opportunities to improve fire prevention and control', Burns, 2016 August; 42(5): 1036–1046. doi:10.1016/j.burns.2015.11.008

A growing concern

Humanitarian campfires 1990 – 2015

- **131** incidents in 31 countries (36 unintentional/ 26 intentional/ 43 unknown cause/ 26 cause not mentioned)
- **487** deaths
- **790** burn injuries
- **50,509** shelters destroyed
- **382,486** individuals displaced

The increase in the reported number of fires in camps indicates a growing challenge to be addressed.

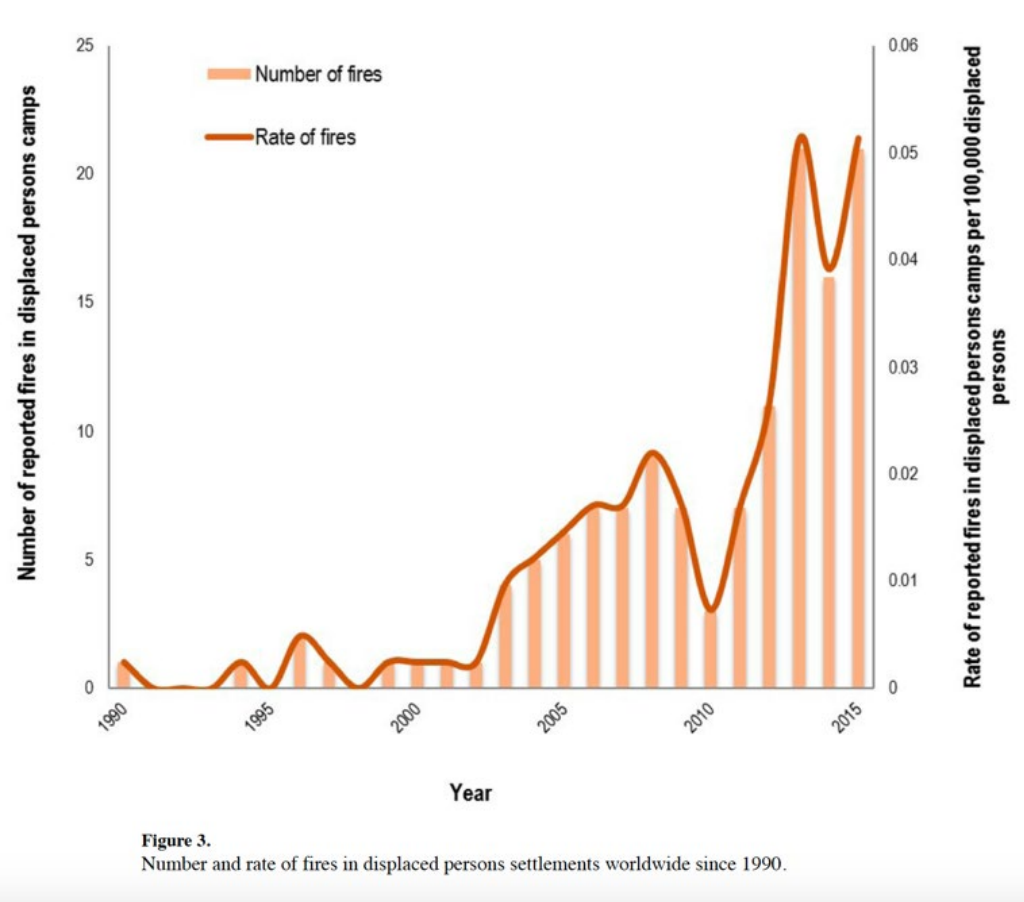


Figure 3.
Number and rate of fires in displaced persons settlements worldwide since 1990.

Source: Kazeroonia, Y et al., 'Fires in refugee and displaced persons settlements: the current situation and opportunities to improve fire prevention and control', Burns, 2016 August; 42(5): 1036–1046. doi:10.1016/j.burns.2015.11.008

The three components of fire safety

Settlement/ camp planning

- Fire breaks
- Distance between shelters
- Secure cooking facilities
- Trained fire wards
- Fire extinguishers

Use/ behavior

- Sufficient distance between walls/ ceiling and stove.
- Secure stove/ heater
- Limit of flammable material stored inside a shelter
- No open fires close to or inside the shelter
- No smoking inside
- General fire awareness
- Maintaining sufficient ventilation
- Refueling of stove outside of the shelter
- Shelter cladding and extensions
- Open and unblocked escape routes

Shelter material and design

- Secure exit of chimney
- Sufficient ventilation
- Fire retardant materials

Fire safety depends on the camp's design, the residents' behaviour, and the shelter materials and design.

Standards and guidelines

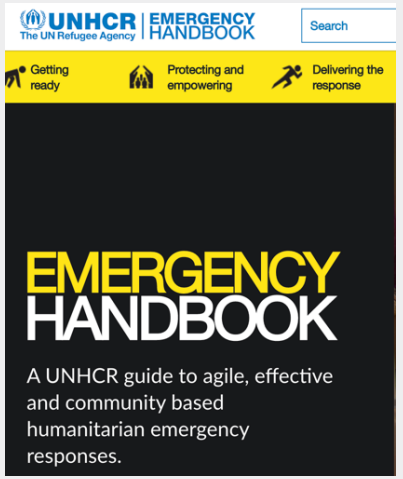
Guidelines on fire safety from leading humanitarian organisations are mostly aligned (but contradictions are common).

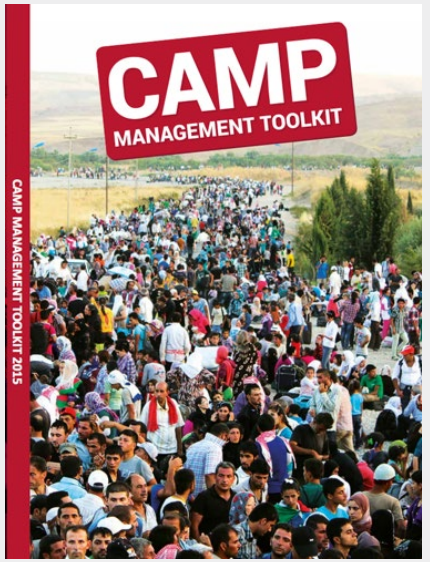
There are no standards that apply to (all) refugee/ IDP situations.

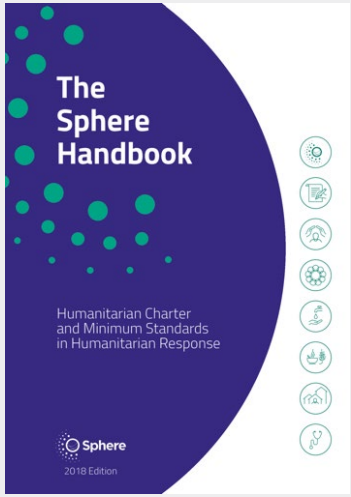
Unclear when the different guidelines apply – across geography and agency.

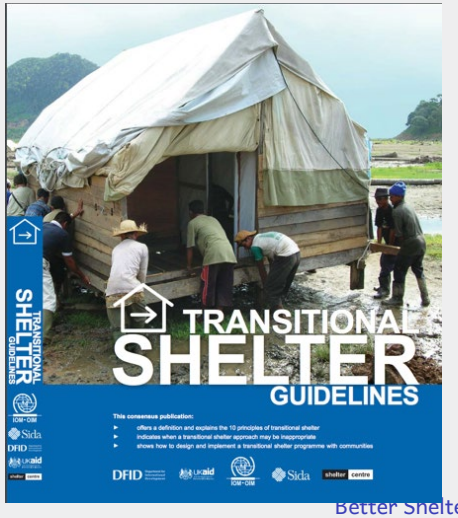
Humanitarian guidelines are, in general non-specific regarding shelter structure requirements/codes and provide little information to specify what materials or fire classifications are – or are not – permitted.

The most acknowledged humanitarian guidelines provide recommendations on fire safety – but these are partly overlapping, partly contradictory, and do not include standards on fire safety in building materials and design.









How we define fire safety

The fire behaviour of a shelter is determined by the design and materials – and equally important – the objects inside the shelter that contribute to the fire (matrasses, furniture, clothes, etc.) and the outside environment (wind).

We evaluate the structure in a full-scale fire scenario test. The test includes one complete shelter with a typical interior for a family of five people.

The test method is developed in collaboration with UNHCR DPSM and the Research Institute of Sweden (RiSe).

Evaluation is based on

- Safe escape time
- Safe distance between units

In addition, any combustible material in the shelter is tested and classified against international standards.

The only way to test real-life fire behaviour is through full-scale scenario fire tests of a furnished shelter.

8 Research institute of Sweden (RiSe) formally known as Statens Provningsanstalt (SP).

Full scale test

Scenario testing is more realistic and demands more of the test object.

Better Shelter and the UNHCR Division of Programme Support and Management (DPSM), together with the Research Institute of Sweden (RiSe), established a scenario test standard to test shelters in full scale.

- Mimics a realistic scenario of a shelter in a settlement, furnished with flammable items inside: matrasses, plastic furniture, textiles, food items, etc.
- Controlled environment (indoor)
- Repeatable test with reoccurring results

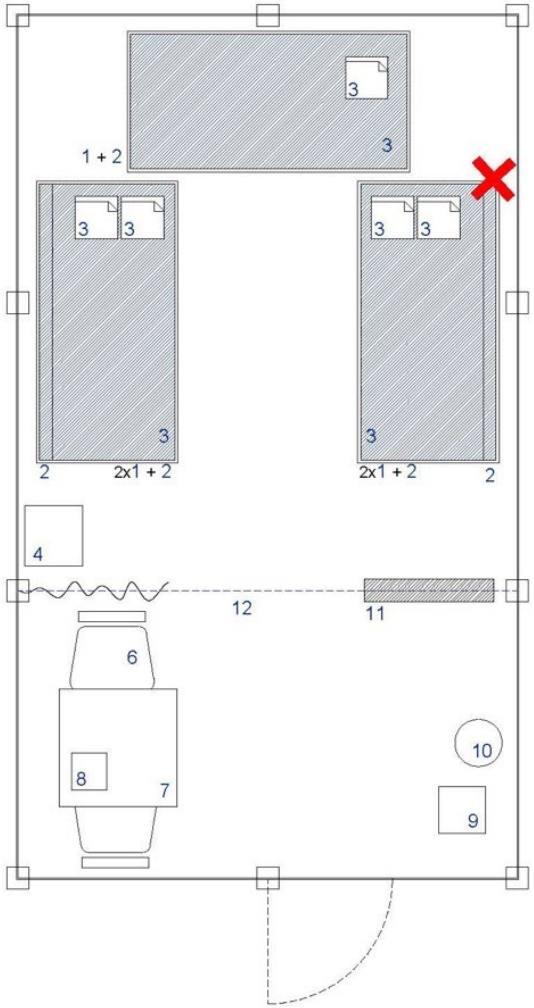
Measurements

Indoor

- Gas measurement (CO, CO_2, O_2)
- Temperature
- Heat radiation
- Visual checks (video recording)

Outdoor

- Temperature
- Heat radiation
- Heat release rate
- Visual checks (video recording)



Safe escape time

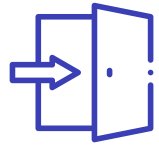
The required safe escape time is the time needed to escape a shelter safely in the event of a fire.

Alert

Alerting time – Before people are aware of a fire – should be a minimum of 30 seconds (daytime) (section 3.2.2).

Prepare

Preparation time – The minimum time needed to prepare before leaving a room – should be a minimum of 60 seconds (section 3.2.3).



Evacuate

Evacuation time – The minimum time needed for evacuation can be determined by mathematical calculations (section 3.2.4).

The required safe escape time is important for any shelter structure, as it informs how much time is required for people to evacuate in the event of a fire. Total required escape time for the RHU is: 30 + 60 + 11 = minimum 101 seconds.

Safe distance between shelter units

When structures catch fire, there is a risk that the fire spreads to a neighbouring structure.

- Flying burning particles e.g., from thatch roofs
- Collapsing structures
- Heat radiation

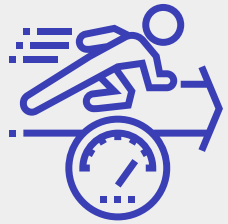
Heat radiation is the heat emitted from a burning shelter and is the factor that determines the spread of fire from one shelter to another.

Safe escape time

The time residents have, to safely escape in case of fire is called safe escape time.

Criteria

- Smoke layer level
- Visibility
- Heat radiation
- Temperature
- Air toxicity



The safe escape time
for the RHU is
2 minutes and 20 seconds.

Safe distance

The safe distance between shelters is the minimum distance required to prevent fire from spreading to adjacent units.

- Measurement of heat radiation
- Determination of safe distance in a no-wind case.
- Determination of sensitivity
- Ignitability of material
- Determination of safe distance in a windy case

Sources: RiSe report 7P01129

Safe distance

Table 6 – Required safety distance at varying wind speeds.	
Wind speed (m/s)	**Safety distances between units (m)***
0	2
2	3
5	4
10	**5**

The safe distance between RHUs is 5 meters.

The exact results are limited to shelter units with the same components and materials as the fire scenario setup (shelter and decoration). However, they provide a "best estimate" for the most common contexts.

In situations where the interiors of the shelters will be significantly different, a new test can be conducted to provide more specific advice.

14 UNHCR Emergency Handbook states 2 times the height of a shelter should be minimum distance i.e. 2x2.83m=5.64m

Heater options

Heater options ranked by risk

- Electric heater
- Kerosene/ diesel/ oil heater
- Wood/ olive pit heater
- Open fire

A higher-risk heater option requires a higher level of fire risk mitigation.

Risk assessment

Always conduct a risk assessment in all shelter implementations and applications.

Assessment results can help inform your choice of risk mitigation strategies.

Such as fire wards, fire breaks, fire extinguishing materials, central cooking facilities, and information.

Summary and conclusions

The fire behaviour of a shelter is determined by the design and materials – and equally important – the objects inside the shelter that contribute to the fire (matrasses, furniture, clothes, etc.) and the outside environment (wind).

Fire safety depends on

- The design of the camp
- Behavior of the residents
- Shelter material and design.

The only way to test real life fire behavior is through full scale scenario fire tests of a furnished shelter.

- **Safe escape time** – the amount of time required for residents to safely escape in the event of fire.
  The safe escape time of the RHU is **2 minutes and 20 seconds.**
- **Safe distance between shelter units** – the recommended minimum distance to prevent spread between units.
  The safe distance of the RHU is 5 meters.