



Fire safety

May 2024



Get in touch!



We support partners before, during and after the implementation of our shelters to get the most out of it.

If you have any questions regarding the implementation of our Shelter products, please get in touch.

You can reach us by phone, WhatsApp, Signal, WeChat and Telegram.

The purpose of this document is to show implementing partners the options for using RHUs and Structure.

If you find any inconsistency in the content of this document or have any suggestions, we would love to hear from you. Please see our website for the latest resources.

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Fire protection in humanitarian settlements

Why is it important?

Displaced persons are more vulnerable to burn injuries than non-displaced 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 initiatives are particularly important in camp settings since displaced persons are more vulnerable to burn injuries than non-displaced.

A growing concern

Humanitarian camp fires 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

More incidents happened after 2015, to name a few: 15 incidents Borno state, Nigeria in 2020, the Moria camp incident, Greece in 2020 and the Cox Bazaar Bangladesh incident in 2021*



Reported number of fires in camps indicates a growing challenged to be addressed.

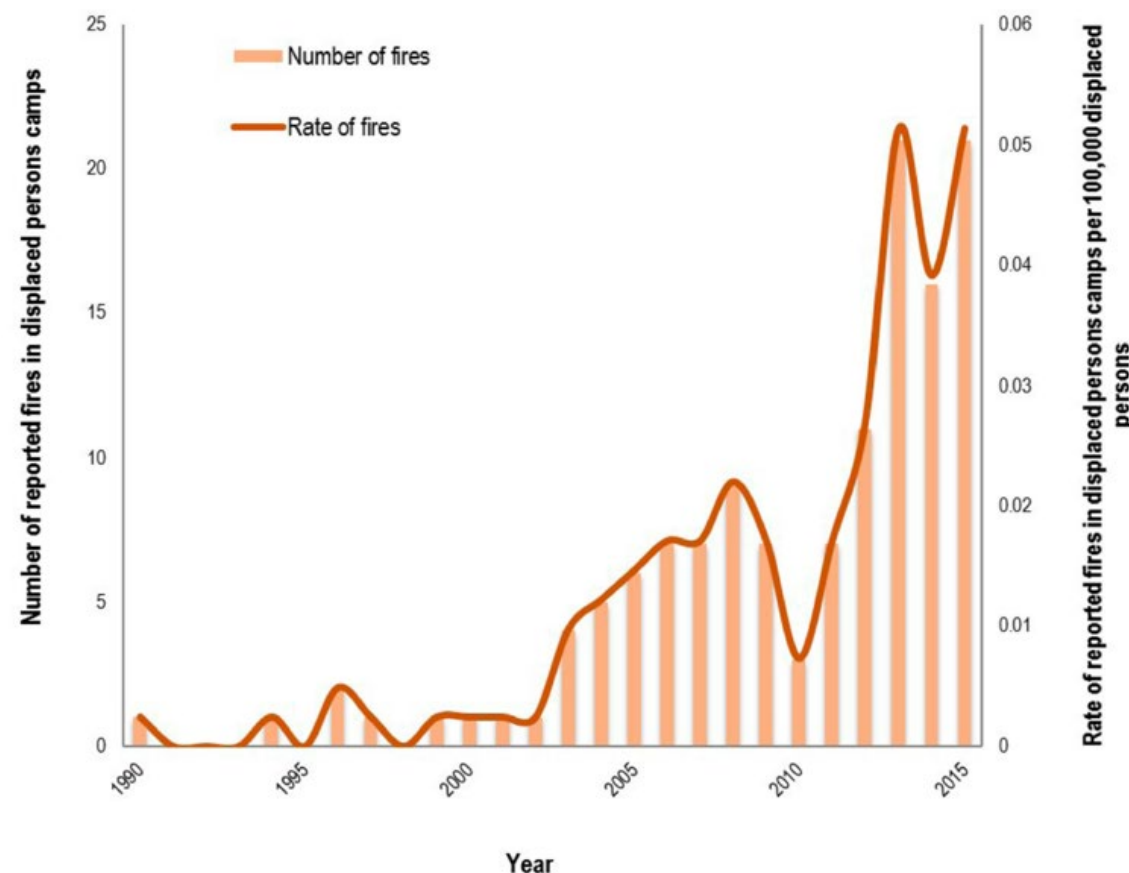


Figure 3. Number and rate of fires in displaced persons settlements worldwide since 1990.

The three components of fire safety



Settlement/ camp planning

- ✓ Fire breaks
- ✓ Distance between shelters (no flammable material between shelters)
- ✓ Secure cooking facilities
- ✓ Trained fire wards
- ✓ Fire extinguishers



Use/ behavior

- ✓ Sufficient distance between walls / ceiling and stove / heater
- ✓ Secure stove / heater
- ✓ Limited flammable material stored inside shelter (NFIs)
- ✓ 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 additions (cladding and extensions)
- ✓ Blocking of escape routes



Shelter material and design

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



Fire safety depends on the design of the site, the behavior of the residents as well as the shelter material and design.

Standards and guidelines



Guidelines on fire safety from leading humanitarian organizations are most often aligned (but contradictions are not uncommon).



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



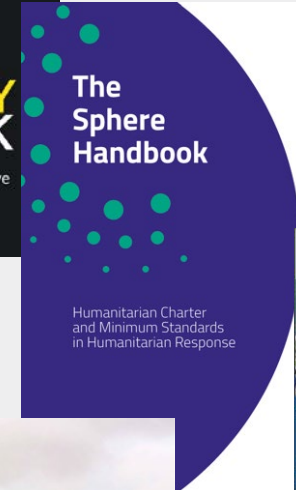
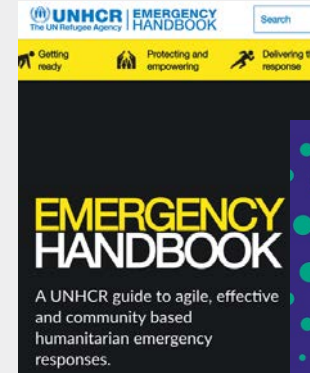
Unclear when the different guidelines apply – across geography and agency.



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



With the publication of “Fire Risk Reduction Guidance for Humanitarian Shelters and Settlements” in 2023 a big step forward is taken to clarify and guide the concepts fire risk and fire safety in humanitarian settings.



How we define fire safety



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



We evaluate the Refugee Housing Unit (RHU) 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 egress time
- ✓ Safe distance between units

In addition, any combustible material in the Better Shelter are tested and classified against international standards.



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

Full scale test

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

Better Shelter and UNHCR DPSM have together with the Research Institute of Sweden (RiSe) set 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: mattresses, plastic furniture, textiles, food items etc.
- ✓ Controlled environment (indoor)
- ✓ Repeatable test with reoccurring results

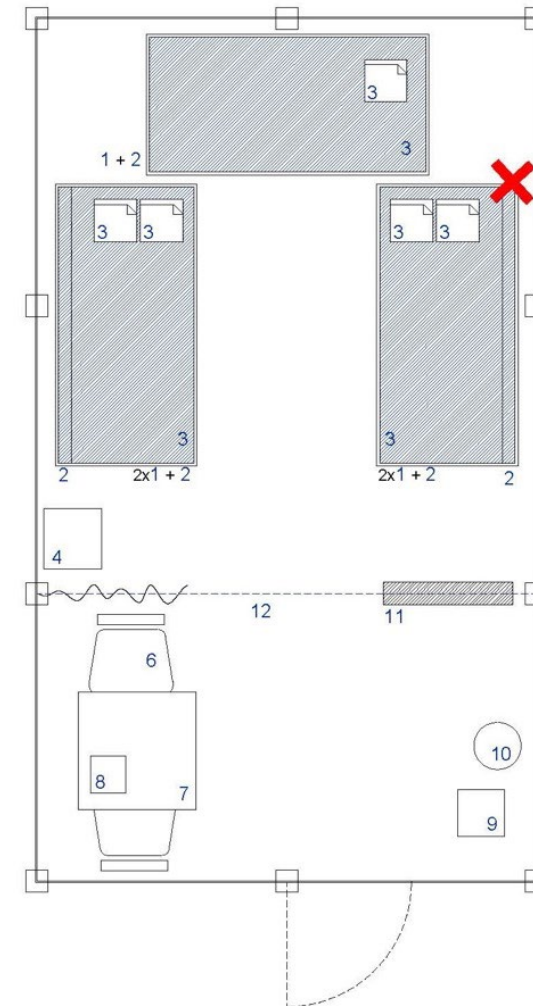
Measurements Done

Indoors

- ✓ Gas measurement (CO, CO₂, O₂)
- ✓ Temperature
- ✓ Heat radiation
- ✓ Visual checks (video recording)

Outdoors

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



Required safe egress time

The required safe egress time (RSET) is the time required to safely escape a shelter in the event of a fire. The Swedish building code has been used to specify the needed safe egress time.



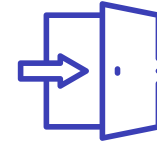
Alert

Alerting time – The time required before people are aware of fire – should be minimum 30 seconds (daytime) (section 3.2.2*)



Prepare

Preparation time – The minimum time needed to prepare before leaving the room – should be minimum 60 seconds (section 3.2.3*)



Evacuate

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



The required safe egress time is important to determine for any shelter structure as it informs how much time is required for people to safely flee in the event of fire. Total required egress time for the Better Shelter is: $30 + 60 + 11 =$ minimum 101 seconds \approx 2 minutes

Available safe egress time

The available safe egress time (ASET) is the duration given residents to safely escape in the event of fire.

Criteria



Smoke layer level



Visibility



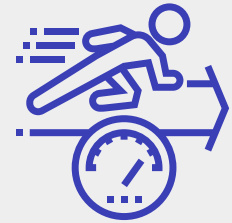
Heat radiation



Temperature



Air toxicity



Based upon testing the available safe egress time for the RHU is **2 minutes and 20 seconds.**

Safe distance between shelter units

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

- ✓ Flying burning particles e.g. with thatch roofs / spotting via embers
- ✓ Collapsing structures
- ✓ Heat radiation



With light weight structures (non brick/concrete) in settlements or refugee camps, heat radiation – that is the heat emitted from a shelter on fire – is the factor that determines the spread of fire from shelter to shelter.



Safe distance

Safe distance between shelter units is the recommended minimum distance to prevent fire spread from one unit to another.



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 give a "best estimate" for the most common contexts. In situations where the interiors of the shelters will be significantly different (much more, or much less flammable materials) a new test can be conducted to provide more exact advice.

When a heating system is applied in an RHU

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



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

Risk assessment

- ✓ Always conduct a risk assessment in all shelter implementations and applications.
- ✓ Assessment results can help inform choice of risk mitigation strategies: fire wards, fire breaks, fire extinguishing materials, central cooking facilities, information, etc.



The fire behavior of a shelter is determined by the design and materials – and equally important – the objects inside the shelter that contribute to the fire (mattresses, furniture, clothes, etc.) and the outdoors environment (such as wind).



Fire safety depends on the

- Design of the site
- The behavior of the residents
- The shelter material and design
- The risk mitigations put in place



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

- **Available safe egress time** – the amount of time required for residents to safely escape in the event of fire. The available safe egress time of the RHU is **2 minutes and 20 seconds** where 1 minutes and 41 seconds is required.
- **Safe distance between shelter units** – the recommended minimum distance to prevent spread between units. The safe distance of the RHU is 5 meters.

Fire safety and use

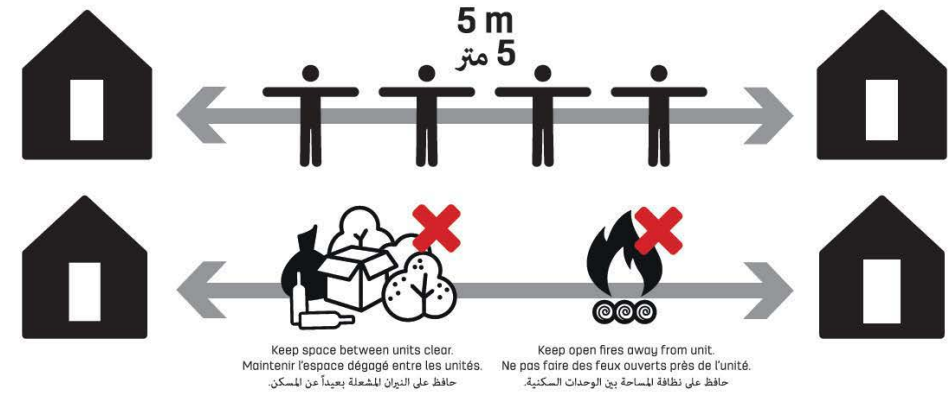
Each RHU comes with a **Fire Safety Guideline sticker** to inform the user about what to do and what not.

Languages: English, French and Arabic

2 minute escape time.
Temps d'évacuation de 2 minutes.
زمن الإخلاء دقيقتين



Prevention outside and around unit



Prevention inside unit

