OFFICE FOR THE COORDINATION OF HUMANITARIAN AFFAIRS

A guide to the use and logistics of family tents in humanitarian relief

UNITED NATIONS

NOTE

the designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

OCHA ref nr. OCHA/ESB/2004/19

United Nations Publication

acknowledgements

This booklet was **written and illustrated** by **Joseph Ashmore.**

The performance standards in part C are an output of a project managed by Tom Corsellis and Antonella Vitale. The author is additionally indebted to Peter Manfield as well as Elizabeth Babister, Nick Baker, Rachel Battilana, Kate Crawford, Claire Grissaffi, Ilan Kelman, Alan McRobie, Anna Pepper, Allen Rand, Robin Spence and Rob Youlton on whose work this booklet is based.

OCHA would also like to thank all those who provided technical comments, support and encouragement during the finalization of this document including Lucia Ashmore, Sonia Ashmore, William Barriga, Gordon Browne, Luigi Bruno, Heiner Gloor, Tim Hayward, Seki Hirano, John Howard, Stef Knell, Richard Lorenz, Julia Macro, Morten Peterson, Thomas Pfeiffer, Barend Leeuwenberg, Ana Marinkovich, Valerie Meilhaud, Steve Ray, François Rueff, Graham Saunders and Yannick Garbusinski.

The Coordinating Editors for OCHA were Isabelle de Muyser-Boucher and Adriana Carvalho Friedheim.

shelterproject.org is a not for profit group devoted to consolidating expertise in responding to the transitional settlement and shelter needs of populations affected by conflict and natural disasters.

foreword

Every year, natural disasters and other emergencies result in donations averaging approximately US$ 3 billion, in cash or in kind. A significant proportion of this humanitarian aid is intended to cover basic shelter requirements for disaster-affected populations, ensuring protection and safety from the elements and other dangers. For example, family shelter and related non-food items made up to nearly 10% of the amounts appealed for during the 2004 Darfur crisis in Sudan.

While relief should reach the victims of disasters in emergencies as swiftly as possible, it is essential that the aid provided is adequate and useful. Very often, the response to shelter needs of vulnerable populations is limited to the delivery of tents and plastic sheeting. A specific technical handbook (Howard and Spice, 1989) describes the advantages and problems of the latter in a variety of situations.

The present guide marks the first attempt to fill the gap concerning the provision of family tents, and to raise the awareness of field, logistics and procurement staff as to best practices in the use of the given materials. The expected outcome is an increase in the efficiency of this type of relief activity to the greater advantage of disaster victims.

OCHA's founding resolution of December 1991 (A/Res/46/182), highlighted not only the central role of the United Nations *"in providing the leadership and co-ordinating the efforts of the international community to support the affected countries"*, but also recalled the mission entrusted to it in the field of improving and rendering more efficient the provision of humanitarian aid.

It is against this background that OCHA is pleased to publish this guide, as a step towards strengthened synchronisation in the areas of information sharing and analysis, logistics support and response coordination. The information contained in the present document results from a truly international coordination effort. It has been widely reviewed by and discussed with major humanitarian relief partners. UNDP, UNHCR, UN-Habitat, OCHA, UNOPS, ICRC, IFRC, CRS, CHF, GOAL, MSF-B/NL/ITC, NRC, OXFAM GB, RedR and

SFL as well as a number of donors (the European Union, Japan, Switzerland, the United Kingdom and the United States) have in particular been associated with defining suitable performance standards. OCHA is especially grateful to shelterproject.org, for leading these discussions and drafting the present document.

Although the discussions around temporary shelter after disasters are ongoing, we hope that the present guide will serve as a milestone in our efforts to support those who so often, so urgently, depend on the international humanitarian community for appropriate help.

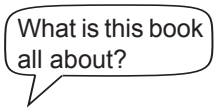
Gerhard Putman-Cramer,
Deputy Director, Natural Disaster Policy,
And Chief, Emergency Services Branch,
OCHA Geneva

contents

1 shelter, settlement and tents

1.1 booklet overview

This booklet explains how and when tents can be used, and how they can be adapted to suit the needs of people in emergencies (**part A**). The technical section of this booklet (**part B**) contains descriptions of tent types and tent parts. **Part C** contains performance standards and indicators for family tents.



not included:

camp and settlement planning
This booklet does not contain guidance on settlement selection and planning for which the guidelines listed in **annex b** should be consulted.

non-family tents
This booklet is primarily about family tents. Larger tents, which have uses such as warehouses and collective centres are not discussed.

other non-food items
Tents must be distributed with suitable non food items such as clothes and bedding. These are not discussed in this booklet.

procurement rules
Field staff should consult their own organization's tent specification and procurement guidelines or the further reading listed in **annex b.**

The main themes to this booklet are:

- **tent camps should be considered a last option** (sect. 1.4)
- **tents are a possible temporary shelter solution** (sect. 2.1)

when tents are used they should not be considered in isolation:

- **tents must be accompanied by suitable non-food items**
- **tents must be accompanied by appropriate infrastructure, services and support**
  including drainage (sect[s]. 2.2 and 2.3), training teams (sect. 2.3) and transport (sect. 4)
- **help people to adapt their tents** (sect. 6)

1.2 what is shelter?

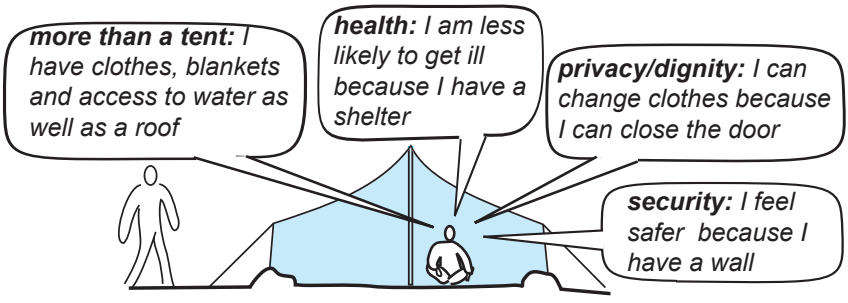
Shelter is a **habitable**, **covered** living space.
Sheltering is the process of providing shelter, involving non-food items and support. Sheltering is a continual process and requires monitoring.

shelter is not just a roof
For a space to be habitable, people living in it must have enough clothing, blankets, mattresses, stoves, fuel, and access to services such as water and sanitation.

1.3 why is shelter needed?

People need shelter to keep healthy, safe and to help to retain their dignity. In emergencies, tents can help to provide for these needs in the following ways:

health
Tents can protect people from external conditions such as rain, snow, wind, dust, sun and vector-borne diseases. By providing this protection, tents can help to preserve the health of those living in them.
privacy and dignity
Tents provide a degree of privacy and help to maintain the dignity of people who may have recently lost everything.
security
Although thin, a tent wall provides some physical protection, for example reducing the risk of theft, and a feeling of security among those living in the tent. Tent camps must have additional security measures established.
livelihood support
Providing a tent can give people time to gather food and fuel, look after their children and conduct other essential activities.



1.4 what is a settlement?

A **settlement** is a community of covered living spaces providing a healthy, secure living environment with privacy and dignity for the people living within it.

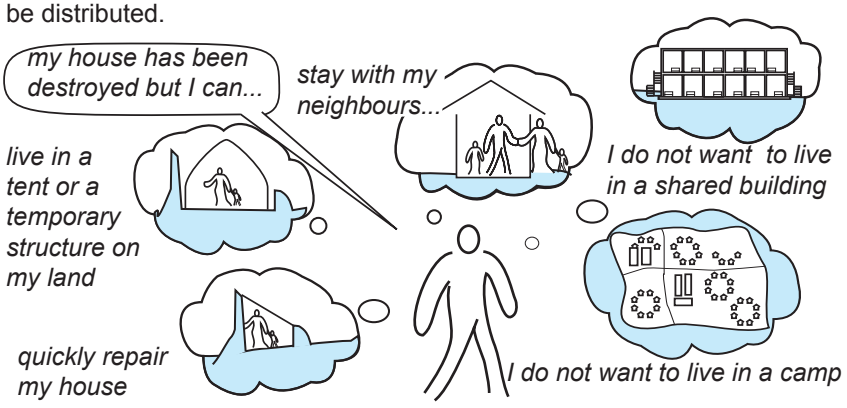
Shelter and settlement options for people who have been forced to move from their place of residence (**displaced**) are often different from those who remain near to their damaged houses (**non-displaced**).

Tents are one of the many shelter options available within settlements, particularly during emergencies. However, tented camps should be considered a last option as they may bring lasting problems.

displaced people
After disasters, people will often have to move to an entirely new location. The possible settlement options are discussed in *Transitional Settlement: Displaced Populations"* (annex b).

non-displaced people
For non-displaced people, such as earthquake survivors, communities often remain intact and people may have access to their own land. Guidance for sheltering non-displaced people is given in *Shelter after Disaster: Guidelines for Assistance* (annex b)

Tents can be useful, allowing people to remain on their land when their houses have been destroyed. However, people are often able to create their own constructions with salvaged and locally available materials before tents can be distributed.



some of a non-displaced person's options

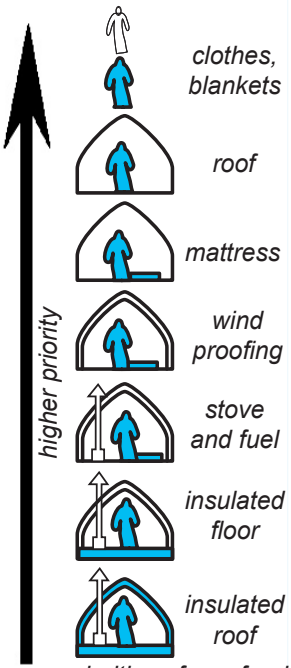
1.5 what is a tent?

tents are portable shelter
Tents are portable shelters with a cover and a structure. The component parts of tents are discussed in section 8.

tent = cover + structure

A tent does not provide for all shelter needs. People living in tents must have access to suitable non-food-items. People must also have access to facilities such as water and sanitation. The shelter provided by a tent includes the area around it (sect. 2.2), including drainage ditches and space for children to play in.

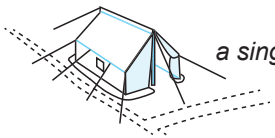
shelter priorities
The primary priority in sheltering people is to keep the immediate space around their body at a comfortable temperature, covered and dry. Clothes and bedding are the most critical parts of shelter. Tents provide a closed heatable space.



priorities of non food items in cold climates

types of tent
There is a variety of different basic designs and shapes of tent (sect. 6). Whatever the shape of the tent, tents are classified as:

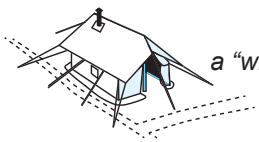
- **single-fly:** Tents with one layer of fabric


a single-fly tent

- **double-fly:** Tents with one layer of fabric and a fly-sheet


a double-fly tent.

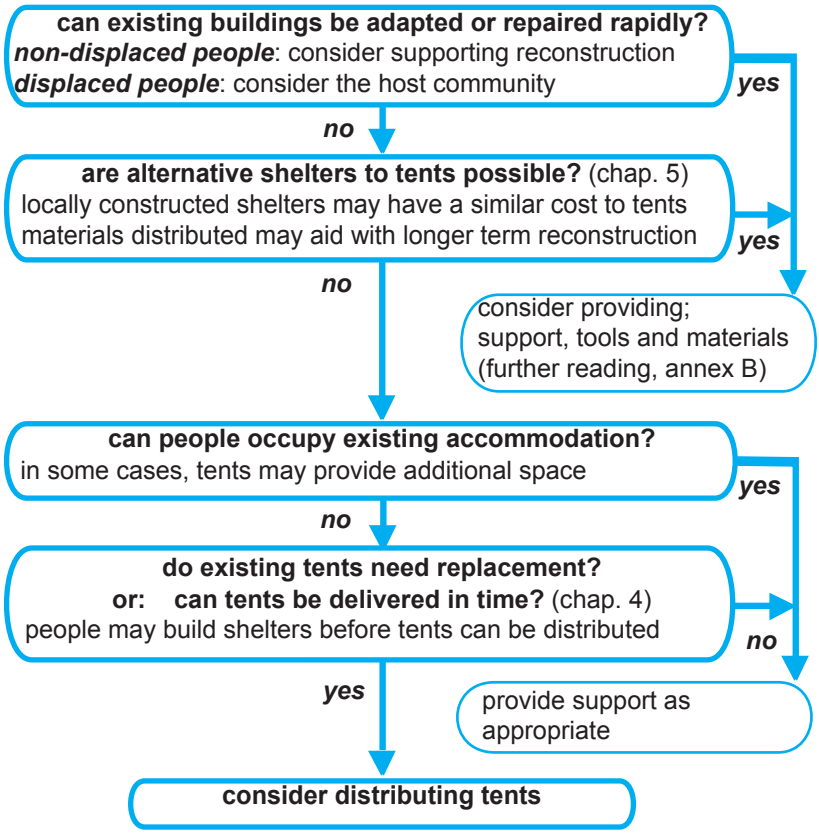
- **"winterized":** Tents which usually have one layer of fabric, a lining (often of cotton), a fly sheet, and a hole for a stove-pipe


a "winterized" tent

2 planning a response

2.1 choosing to distribute tents

tents are a possible emergency shelter solution
Tents can rapidly create cover for people in need of shelter (sect. 1.2). They can also help non-displaced people to stay on their land (sect. 1.3). Once a settlement strategy has been chosen (sect. 1.3), the following shelter options are to be considered before distributing tents, see diagram below.



considerations for tent distribution
when choosing to distribute tents, consider the following points:

- **vulnerable populations**

The decision to use tents should involve the most vulnerable people, such as the old and minority ethnic groups. Most people are not used to living in tents.

- **cultural issues and the host population**

Distributing objects as valuable as a tent may cause inequality and resentment.

- **shelter needs change with time**
- **climate and weather** (chap. 3)
- **politics**

The decisions to use tents are often made by authorities or supporting organisations. The use of tents often implies that a settlement will be temporary.

- **participation**

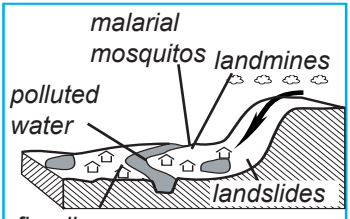
Wherever possible, involve people in the decision as to how shelter is provided.

2.2 site selection and planning

This section notes some of the major planning considerations for tent camps, but it is not a manual on site selection and planning.

tents must be carefully sited

Choose sites for tents carefully. A badly chosen site can create major problems. Where many tents are involved or camps are being set up, specialists should be involved with the site selection. Tented camps should be avoided where possible.



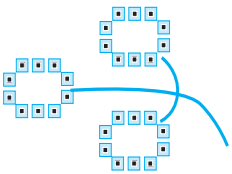
some of the risks at a site.

site planning

Have a clear plan for the site. Good planning of camps can reduce specific risks such as fire. It is much harder to move people and their tents once they are settled.

clusters of tents

Tents should not be pitched in long rows. Pitching tents in clusters may be more like the villages where people used to live. Care should be taken to ensure privacy, access to water and sanitation facilities. Special care should be taken with placing vulnerable groups such as sick people and minority groups.

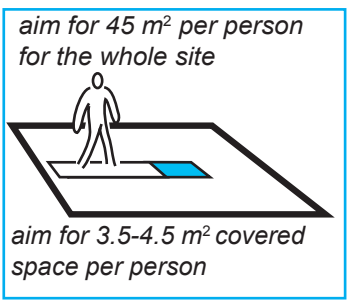

tents in clusters

how many tents can I pitch

Sphere indicators and guidelines from the Office of the United Nations High Commissioner for Refugees (annex b) suggest:

- Aim to provide at least 45 m^2 per person for the whole site, including facilities such as water taps and roads
- Aim to provide 3.5 m^2 covered space per person or 4.5 m^2 per person in cold climates.

Note that by these indicators, a standard 16 m^2 family tent should only hold four people.

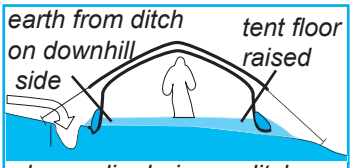


Further reading on settlement selection and planning can be found in the shelter guidelines section of annex b.

2.3 putting up tents

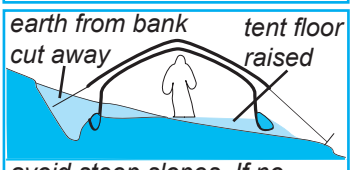
When tents have been distributed (sect. 4.4) they need to be put up. For people who have never put up a tent before and for vulnerable people, this can prove difficult and teams of people, tools and training should be available. Below are some key points to consider when putting up tents.

drainage: shallow slopes
Do not put tents on land prone to flooding. Sphere guidelines (annex a) suggest a slope of between 1 and 6 per cent. With shallow slopes, the land may not drain.



always dig drainage ditches

drainage: steep slopes
If it is necessary to put tents on a steep slope, be aware of the risks of landslides. Digging will also be required to create level land for the tent.



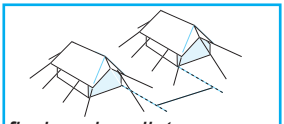
avoid steep slopes. If no choice, level and stabilize soil

drainage: ditches
Always support people to dig drainage ditches around tents to prevent the tents from flooding with the rain. Connect drainage ditches from each tent to a site drainage solution. The depth of the drainage ditches depends upon:

- expected quantity of rain
- type of soil and its infiltration capacity
- slope of the site.

In extreme circumstances, ditches need to be as much as 50 cm deep. Such deep ditches may be unstable and need to be filled with stones to prevent collapse, injury or filling with stagnant water and rubbish.

firebreaks and spacing
Tents should be a minimum of 2½ times their height apart. There should be regular firebreaks between blocks of tents. Note that guy ropes can take up a significant amount of space.


firebreaks: distance between tents should be 2½ times their height

orientation
In windy places, doors should not face the most common wind direction.

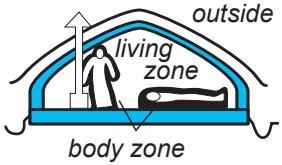
trees
Tents should not be pitched under dead trees or palm trees, as there is a danger of falling branches or coconuts hurting people. However pitching tents near healthy trees can protect tents from the sun and the wind.

3 climate

3.1 all climates-overview

Tents help to protect people from extremes of climate. Be aware that there may be large changes of climate between seasons and between night and day. People are most vulnerable during times of extreme hot or cold. Seasonal variations may have to be accompanied with upgrading and secondary interventions such as stoves, blankets and tent linings.

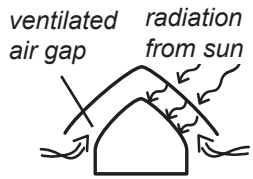
more than a roof
The priority is to keep air close to the body at a comfortable temperature. The air movement close to the body is controlled by suitable clothing and bedding. A tent may also require stoves, fuel and flooring, to keep the air in which people live and breathe at a comfortable temperature.



3.2 hot dry climates

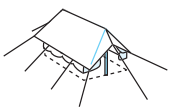
tent function
In hot dry climates, tents should provide shade from the sun, and be ventilated for cooling. In desert environments and at altitude it can be cold at night, so winter tents may be required. It should be possible to close tents to dust and wind.

flysheet
In hot climates, tents with flysheets are the most effective way of keeping the occupants cool. The flysheet should be separated from the inner tent as this creates an air gap, which is ventilated.



A flysheet can reduce heat gain from sun

opening tents
It should be possible to open tent doors. Tent designs with ties to raise sides and hold doors open are best.


sides of tent raised for ventilation

shaded external space
Covered external areas are often made to provide shade. Trees and vegetation can also provide shade.

3.3 hot humid climates

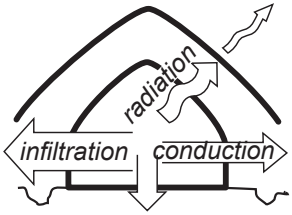
tent function
In hot humid climates, the main function of tents is to provide shade from the sun. Tents should be well ventilated and have appropriate drainage.

rotting
In humid environments, cotton canvas is particularly prone to rotting. Tents should be rot proofed (sect. 8.4.1) at the time of manufacture, although they may still decay within six months.

3.4 cold climates

avoid tents
Tents are difficult to keep warm in cold climates as they lose heat quickly. Extremes of cold are typically experienced just before sunrise.

basic provision
A basic winterized tent has a flysheet, a cotton lining and a hole for a stove-pipe. Care must be taken to ensure that people have access to adequate clothes, blankets and stoves (with chimneys and fuel) (sect. 6.3). Keep people off the ground on beds or mattresses (sect. 6.4)



major sources of heat loss for a tent

when locating tents, take into account local climatic variations such as where wind is funnelled through gaps in mountains, and shading from the sun in deep valleys or under cliffs. Orient doors away from the prevailing wind.

block draughts
Blocking draughts (reducing infiltration heat losses) is the key to keeping tents warm. Draughts cause warm air to be removed from close to the body, and lead to increased evaporation and wind chill. They can be blocked by digging tents into the ground, building walls and blocking gaps. However care needs to be taken so that people do not get suffocated or poisoned by stoves (sect. 6.2).

more food in winter
In cold weather, people burn more calories, so food rations may need to be increased. Malnourished people may die through loss of energy from excessive shivering.

4 logistics

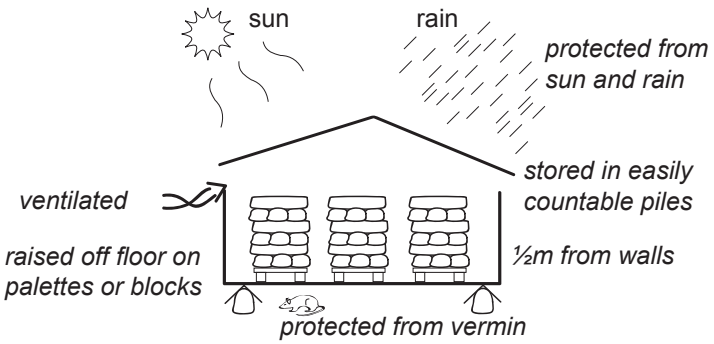
4.1 procurement

consult headquarters
Consult headquarters before procuring tents. Tents are frequently subject to frame agreements with specified manufacturers. Tents are also expensive in comparison to other family relief items, and may take a long time to deliver.

Section **8** and the agency procurement catalogues in **annex b** contain further information for the procurement of tents.

4.2 storage

Canvas tents are difficult to store as they will rot. As a result many agencies procure tents when they are needed. This needs to be balanced against production times which can be long, especially during large-scale emergencies.



Tents should be:
- stored protected from the sun, rain and vermin
- stored dry and well ventilated off the ground
- kept in easily countable piles at least ½ m from walls
- regularly checked to ensure that they are not damp and rotting.

regional warehousing pre-positioning tents
Due to the high cost of transporting tents by air freight (sect. 4.3), pre-positioning tents for slow onset emergencies and maintaining stockpiles of tents regionally is common. However, this must be balanced against the difficulties of storage.

4.3 transport

expensive to transport
Standard relief tents are heavy (70 kg-100 kg) in comparison to other relief items. This makes them expensive to transport. At the time of writing, a new generation of lightweight tents is in development for use in the first phase of emergencies.

air freight
In an emergency, air freight is frequently the quickest means of transporting tents. However, air freight can cost as much as the tents themselves.
road transport
Tents are usually transported some or all of the way to a distribution site by road. Be aware that many trucks may be needed for tent distributions.
shipping
Shipping is frequently the cheapest way of transporting tents over long distances, but it can lead to delays. Shipping is most useful when tents are being pre-positioned or being used to replace old tents.

4.3 distribution

local transport for tents
Consider providing local transport for tents from the distribution point. When they are distributed, the ability of the weakest people to carry them should be considered. Many tents are too big to fit on a donkey and require at least two healthy adults to carry them short distances.

teams to put up tents

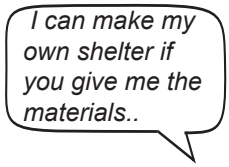
Consider forming a team managed by community members to erect some sample tents with drainage ditches. This will help to ensure that tents are correctly erected and communities participate in putting them up. Care should be taken to ensure that vulnerable people receive support. In some circumstances, teams of people may put up all of the tents ready for families.

tools needed for putting up tents
Tent distribution should come with tools to help put them up:

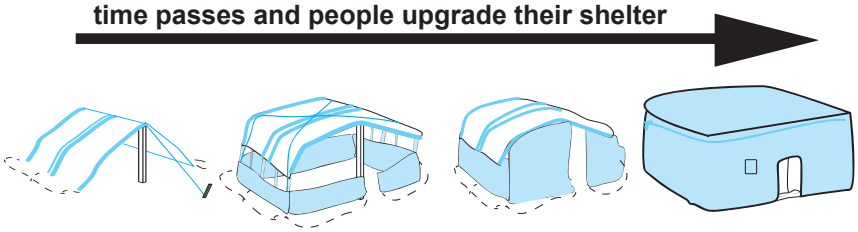
- one **strong mallet** per tent
- one **spade or shovel** per 20 tents (more if soil is hard and time limited)
- one **pickaxe** per 20 tents (more if soil is hard and time limited)
- spare tents in case of raised demand. Spares will be required for damage in transit and storage.

5 alternatives to tents

Tents are not the only form of emergency shelter structure. Depending on local conditions, quick repairs can be made to damaged buildings, or temporary shelters can be created from locally available materials such as plastic sheeting, wooden poles and rope. Support for such shelters can involve communities more actively, and can provide materials that have a longer lifetime than tents. They may also be available more quickly and at a lower cost than tents.



Prefabricated, flat-packed and container shelters are not discussed here because they generally have a high unit cost, a long production and transportation time, a high transportation cost or are inflexible. They are advised against in all of the guidelines listed in annex b.



immediate structure from plastic sheeting poles and rope

roof raised with sticks and mud infill

mud walls and plastic sheeting for roof

building upgraded with adobe walls and roof. Plastic sheeting in roof

example of how people might develop materials delivered through emergency assistance into more permanent structures

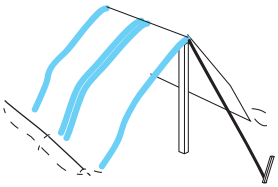
5.1 plastic sheeting, poles and rope

description:
Distribution of plastic sheeting is one of the most common parts of emergency shelter provision. Providing poles with plastic sheeting (sect. 8.4.1) can significantly reduce local environmental damage from many people cutting larger trees to create frames. Providing rope, nails, and other fastenings will help people to fix their sheeting more firmly, extending its use and durability. People may use basic materials to make structures to which they are more accustomed. Metal sheets are a more costly alternative to plastic sheeting and require more skill to use, but are more durable.

materials:
- plastic sheeting, metal sheets
- wooden or metal poles
- Ultraviolet (UV) stable rope, nails. Note that nailing straight into plastic sheeting will tear it, and that the load should be spread using batons, wide-headed nails or similar materials.

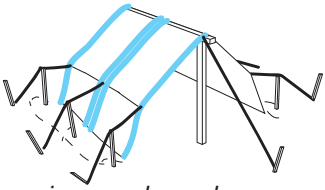
advantages:
Distributing sheeting with poles and rope can lead to a very rapid shelter response. Good quality materials may remain useful for many years, and be adapted by people to help reconstruct their houses.

disadvantages:
Vulnerable people and their level of ability to build shelters must always be considered when distributing basic materials for the construction of their own shelters. Distributing poles, rope and sheeting may not provide as complete a shelter as a tent does, especially in extreme climates. Note that a 5 m x 4 m plastic sheet has about one quarter of the material of a winterized tent. The effects of procuring and distributing materials on the local market and the environment should also be considered.



basic structure with wooden poles and rope in tension with a plastic roof

sheet buried in trenches to fix sheet to ground



structure using wooden poles, a wooden ridge and a plastic roof. This structure is less likely to weaken as the plastic sheeting stretches and the poles sink into the ground

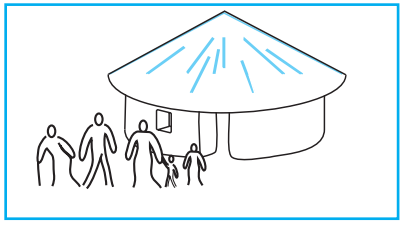
5.2 traditional shelter

description:
Locally built shelters constructed using local technology, materials and building traditions. They may vary from quickly erected structures of sticks and leaves to more solid shelters using earth or cement. Such shelters may be upgraded later as a step towards reconstruction and permanent housing. Long lasting locally built housing may be cheaper than supplying tents.

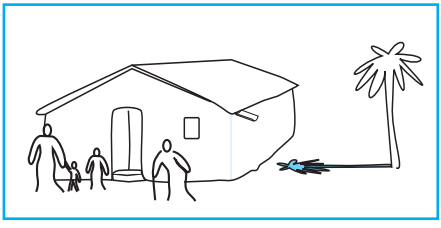
materials:
Traditional shelters generally use locally available materials such as woven sticks, simple rammed earth, adobe, plastic sheeting, leaves, old metal sheeting, or straw.

advantages:
Locally built shelters often cost less than tents as there are reduced transport costs. They are more culturally appropriate, better for future adaptation, easier to repair and maintain, use local skills and materials which contribute to the local economy, often provide a more thermally comfortable living environment, last longer and have a higher long term value than tents and temporary structures.

disadvantages:
Locally built shelters take longer to build. They can encourage people to stay in “temporary” settlements, which may be politically unsustainable. They may cause environmental damage through harvesting of construction materials such as timber and grass. If they are built too well, tensions may develop between displaced people and the host community.



example of locally built shelter using mud-block walls and thatched roof

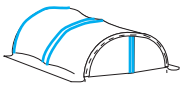


example of locally built shelter using mud-block walls and galvanised sheet roof

5.3 tunnel structures

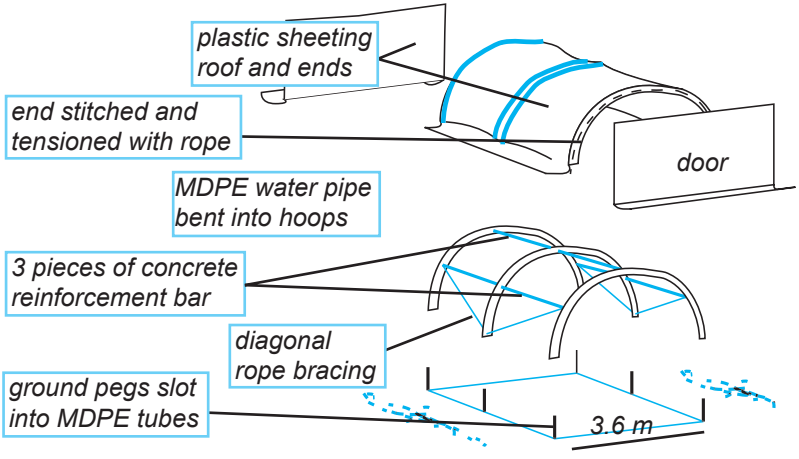
description:
A design of a tunnel-shaped structure that can be made from building materials is given below. If available, agricultural polytunnels could be used as an alternative. To attach the plastic flysheet (sect. 8.4.1); unfold the plastic sheet on the ground and weave a rope through the reinforcement strip at either end. Then, place the sheet over the end hoop. Pull the rope tight and tie the rope off at the corner pegs.

materials for a 3.6 m x 3.6 m tent (using a 7 x 4 m UNHCR standard plastic sheet with reinforcement bands cut from a roll):
The following will be required for one shelter



- 3 x 6 m x (63mm outer diameter) Medium Density Polyethylene (MDPE) water pipe,
- 3 x 3.6 m x 12 mm iron bar for horizontal bars,
- 6 x 0.5 m x 12 mm iron bar (pegs),
- 1 x 7 m x 4 m plastic sheeting for roof
- 2 x 2 m x 2 m plastic sheeting for doors
- 32 m rope - cut into 4 x 7 m pieces for ends and bracing.

advantages:
These structures have a short lead time if the relevant materials have already been supplied to water and sanitation programmes. These shelters can be manufactured on site.
disadvantages:
MDPE water pipe is often difficult to procure in sufficient quantity and quality. It is required for its strength and flexibility. There are few appropriate alternatives.



6 user adaptations

6.1 changes people make (and how to help them)

maintain, modify, adapt and improve

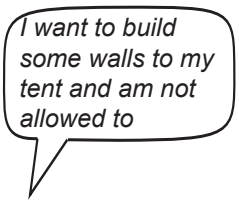
Tents can often be improved with locally available materials. People will adapt their shelters to suit their needs best. To support these changes it may be advisable to:

- keep a stock of spare parts and tents
- help by providing sewing machines for repairs, and welding equipment for broken poles
- keep spades and other tools available.

If people are making major modifications to tents, more appropriate shelters should be considered for the future. Alternative options such as housing, poles and palm mats are discussed in chapter 5.

land use

Building small walls may increase the life of the tent and reduce draughts inside. However, tents may be being used owing to political or land rights issues. In these circumstances, gaining permission to build walls of mud or stone in tents may increase tent life but should be balanced against the political consequences of creating more permanent structures.

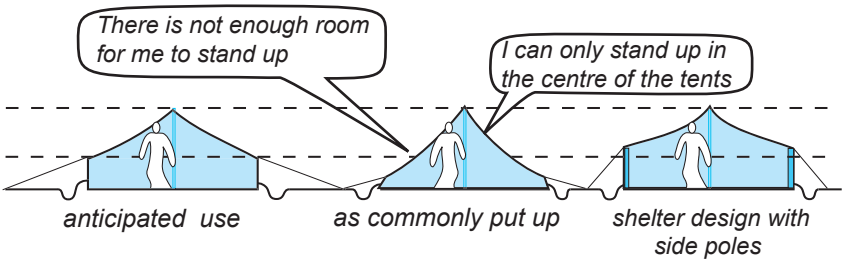


environmental

Some adaptations can have significant impacts upon the local environment as wood and foliage may be taken. This can lead to permanent deforestation and erosion. These adaptations may, in some cases, be supported though distribution of poles.

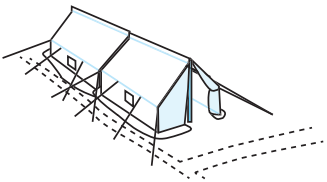
6.2 extensions

Standard 4 m x 4 m family ridge tents have low walls. Although it may be possible to stand up in the middle of the tent, there is little headroom at the sides. They are also frequently put up with the guy ropes closer to the tent than designed, this further reduces headroom. Using side poles increases the internal height.



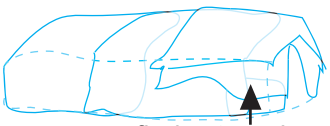
joining tents

People frequently join tents together to make larger structures. People should be allowed to do this, although additional material such as plastic sheeting may be required to waterproof the joints between the two tents. Some tent designs specifically support this adaptation.



using flysheets

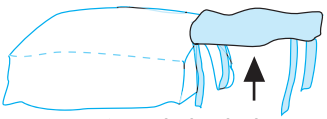
People may use the flysheet as an extension, creating a larger but single skinned tent. If people make this change, they should be made aware that they will have problems when it rains. Their tents will also not gain the benefits of a ventilated air gap between the flysheet and the inner tent. It will be less comfortable in very hot, cold or wet climates.



flysheet used as extension

external shaded areas

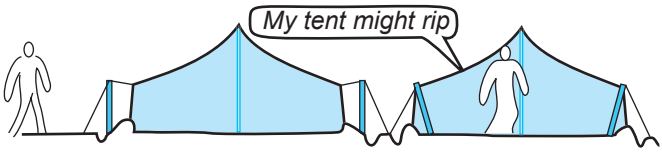
In hot climates people may build a sunshade from straw in front of the tent. This can provide an area to store animal feed for the dry season. This should be encouraged where foraging for straw and poles does not unduly harm the local environment.



external shaded area made from straw on wooden poles

using sticks and poles to prop up the sides

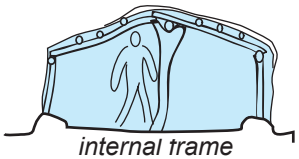
People may try to enlarge the area inside the tent and make it more stable by using sticks to prop up the sides. Where they do so, sticks should be on the outside rather than on the inside of a tent, as this may puncture the canvas.



external sticks holding up eaves *internal sticks holding up eaves*

building an internal frame

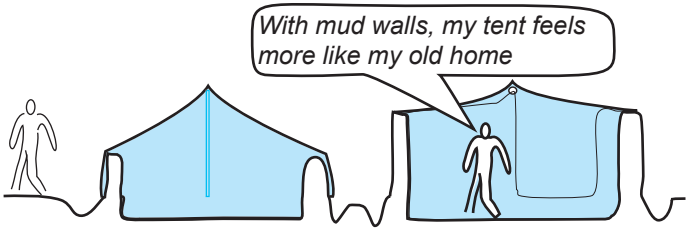
People may build an internal frame to support the tent canvas. This form of construction should be encouraged as people are making shelters to which they are more accustomed. However it may lead to environmental issues as, when large camps are being set up, there will be a sudden rush for construction timber.



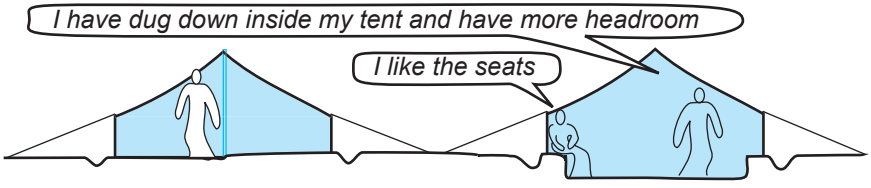
internal frame

build mud walls

Mud walls provide draught proofing, thermal mass (keeping the shelter warmer in winter and cooler in summer), and make the tent feel more solid. With time, the walls can be extended, and a solid roof constructed. Their construction should be encouraged unless there are major political problems with the camp being seen as permanent.

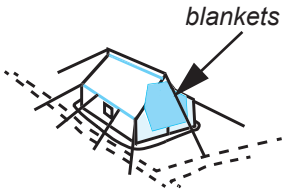


In areas not prone to flooding, tents can also be excavated down, reducing draughts and creating more headroom.



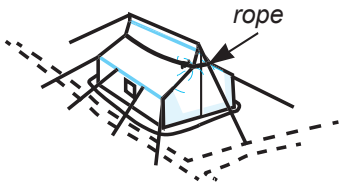
block draughts

In cold climates, draughts can be blocked using blankets or available material. These can be put at the doors where most cold air leaks in. Note that some ventilation must be maintained – especially when stoves or fires are being used.



stop fabric flapping

Sometimes people fix rope around the outside of the tent to stop the tent flapping. This **should be avoided** as it reduces head height and puts strain on the canvas. Instead, people should be encouraged to erect tents properly. Tents should also be oriented with doors away from the prevailing wind.



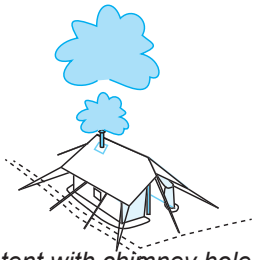
6.3 adapting tents: providing stoves

heating and cooking
When cooking or heating takes place in tents, there are public health risks of tent fires, respiratory disease and eye infection from smoke. In many cases efficient stoves with flue pipes that burn appropriate fuel are essential.

communal kitchens
In warmer climates, where fuel is only used for cooking, consider setting up communal cooking facilities. For communal cooking, expert advice is essential.

appropriate stoves
When fuel is burnt indoors, tents should be provided with a stove and a chimney. Further reading on appropriate fuel and stove selection can be found in *Cooking Options in Refugee Situations* (annex b). A good stove will:

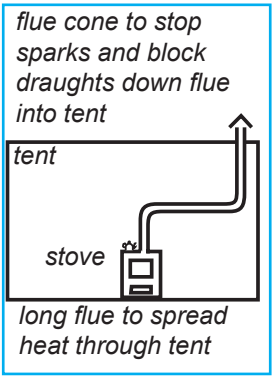
- significantly reduce fuel consumption. This will reduce local environmental damage from fuel collection, as well as time and effort spent collecting it and potential conflict with host populations
- reduce health risks from indoor wood smoke
- serve for cooking as well as heating needs



tent with chimney hole in roof (winterized)

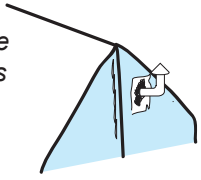
fire safety
Stoves in tents are dangerous, but if used carefully, the health benefits can be greater than the risks involved.

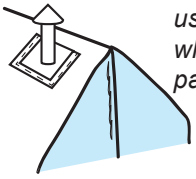
- stoves must be located away from the tent wall
- chimneys must have caps to prevent sparks falling back onto the tent.



Chimneys usually pass through a metal plate attached to the tent roof, or a cement-fibre plate in the wall of the tent. Where no plates are available, chicken wire can be used.

using chicken wire where flue passes through tent

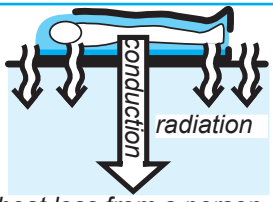




using a flue plate where the flue passes through tent

6.4 adapting tents flooring and mattresses

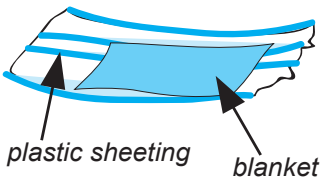
Flooring, mattresses and beds prevent heat loss from people sleeping on the ground. They also help to keep the inside of the tent dry and help to keep it warm. Personal insulation such as a mattress will help people to keep warm. Mattresses and flooring are frequently neglected as they are expensive and bulky to transport, but are very important in keeping people comfortable, healthy and alive in the cold.



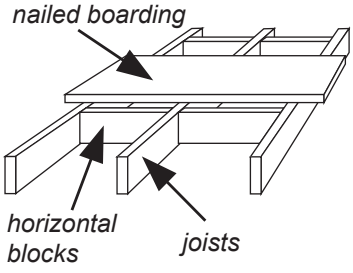
heat loss from a person to the ground

earth floors
Many houses in dry environments traditionally use earth floors. In some cases they are traditionally made with mixtures including clay and dung. In damp environments, they may need to be covered with a waterproof layer and suitable materials should be distributed.

plastic sheeting
Flooring for tents is commonly created by people with the limited materials available. This should be encouraged. Many tents are distributed with a plastic groundsheet (sect. 8.4.1). People supplement this with blankets, sacks, cardboard and other materials. Plastic groundsheets prevent ground moisture from the ground affecting people sitting on the floor.



wooden floors
In a few places raised timber floors can be considered. These can be made from timber or where available, pallets. An air gap of just 1 cm will provide appreciable insulation. Where timber is purchased for flooring, be aware of the potential environmental impacts.



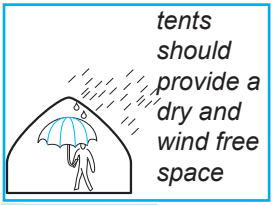
mattresses, beds
Foam mattresses or raised beds can serve to keep people off the floor at night and can be used as seats during the daytime.

6.5 common tent failures (and ways to fix them)

Tents fail through wear, rot, sunlight and misuse. The best way to prevent tents from failing is:

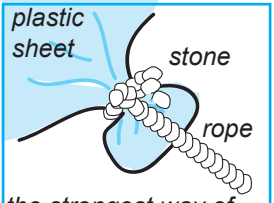
- **be aware of variations in quality when buying tents**
- **store tents carefully for the shortest possible length of time** (canvas tents should be stored for months rather than years, their durability in storage depends on packing and warehousing)
- **erect tents properly**
- **minimize the number of times tents are moved**
- **order extra tents for those damaged in storage, transport or use.**

6.5.1 water leaks into tent



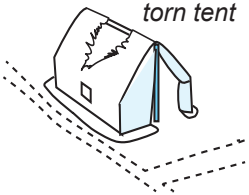
Canvas frequently fails and allows water to leak.

- Do not store tents for too long. New tents that have been stored for a long time may leak when it rains as the fibres shrink
- Stop anything from touching the tent canvas. Even new tents will leak when material touches the inner tent, as the water will soak through the canvas
- If tents are leaking, plastic sheeting and rope can be distributed to cover the outside of the tent. Try to make a ventilated space between the plastic sheet and the tent. The strongest way to attach a plastic sheet is by wrapping a small stone in the sheet and tying the rope around the other side.



the strongest way of attaching a plastic sheet using rope and a stone

6.5.2 fabric tears and rots



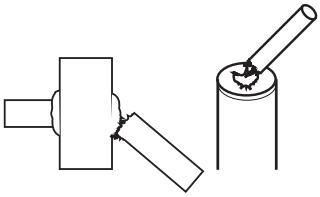
Tent fabric often tears and rots after prolonged use. This can lead to water leaks, let warm air escape and cause the tent to collapse.

- replace broken sections and patch tears to prevent them from spreading
- use ropes and poles to hold the structure up to reduce the stress on the canvas (sect. 6.2)
- Prevent the tent from flapping in the wind (sect. 6.2) by putting up the tent correctly and regularly adjusting the guy ropes
- Avoid sharp sticks, which make poke through the canvas (sect. 6.2)
- Erect tents properly keeping the fabric tight. Be careful not to overtighten the guy ropes. Note that damp ropes and canvas will shrink when they dry.

6.5.3 poles snap

Tent poles most frequently fail where they are weakest - at joints and at spikes.

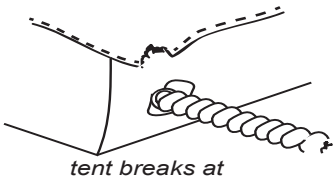
- broken spikes may be temporarily repaired with round tent pegs, metal bars or rope.
- joints or permanently bent poles may not be repairable and may need to be replaced.



poles break at joints

6.5.4 guy ropes and attachments fail

The guy ropes can fail because the rope breaks, the pegs are not properly fixed to the ground or the tent rips where the ropes are attached.

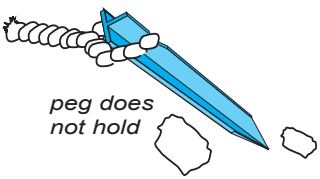


tent breaks at rope attachment

tent rips where the guy ropes attach
The tent may need to be reinforced (using a needle and strong thread or string) where the guy ropes are attached.

guy rope breaks

guy ropes snap or wear out
Rope can degrade with sunlight in as little as six months, whilst cotton rope can rot. Use black or UV-stable rope.



peg does not hold

pegs do not hold
Pegs may not hold in soft or sandy ground or may bend because the ground is very hard. Try digging the pegs into the ground before burying them or covering them with stones.

6.5.5 doors fail

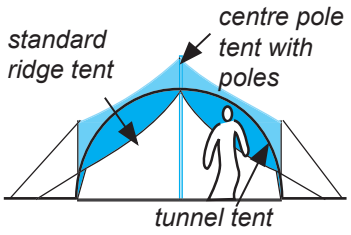
Doors on tents often tear. Usually this is due to zips failing, Velcro getting clogged or eyelets breaking. When rope is used in snow or wet freezing conditions, the doors can freeze shut. Lacing or toggles with overlapping canvas is the best way of closing tent doors.

7 types of tent

7.1 introduction

This section gives an overview of the most common tent designs that are used in emergency relief.

Tents from the leisure industry and expedition markets are not included in this booklet. Affordable hiking tents are generally too small for family use and are generally not durable enough for prolonged use in a camp setting.



different head heights in different tents

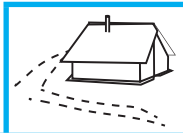
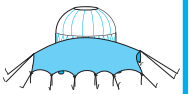
shape
The most common shapes of family relief tents are summarised in section 7.2. Tunnel shaped tents and tents with poles to support the walls provide most head height. However they also require the largest number of poles, and can be heavy.

In addition to the actual shape of the tents, there is a significant variation in the number of layers involved. Some tents have a single flysheet, others have a double flysheet, and others have varying thicknesses of insulation.

Most agencies have their own tent specifications and preferred tent designs.

7.2 types of family tents

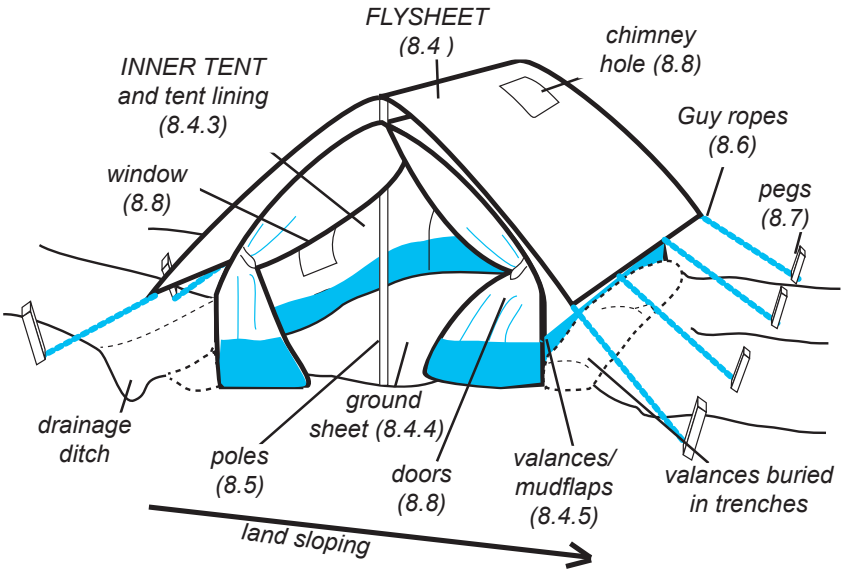
The table on the next page gives a summary of the principal tent designs as used in emergency relief. It also includes traditional and nomadic tents for comparison.

						
type of tent	**ridge tent**	**centre pole tent (tall wall)**	**centre pole tent (low wall)**	**hoop tent**	**frame tent**	**nomadic tent (traditional)**
description	traditional relief tent. Poles: 2-3 vertical, 1 ridge pole	centre pole tent with high walls. Walls held up by poles	tent with centre pole and low walls	tunnel-shaped tent	tent built on a rigid frame from flat poles	tents used by nomadic peoples (many designs exist)
covered area	12 m^2 - 16 m^2	16 m^2- 24 m^2	12 m^2-16 m^2	12 m^2-18 m^2	16 m^2	10 m^2-30 m^2
advantages	tried and tested design	good headroom	relatively lightweight	good headroom, small footprint	good headroom throughout	well adapted to local climates materials and traditions
dis-advantages	limited head-room at sides	can suffer in strong winds. Heavy	limited headroom	requires many poles. Technology in development	requires many poles. Often expensive	large scale production in short period not possible
weight with flysheet	75-120 kg	120 kg	50-100 kg	40-80 kg	100-120 kg	200-300 kg

8 tent components

8.1 introduction

This chapter contains a detailed description of the component parts from which a tent is made. Detailed procurement specifications can be found in the procurement catalogues in the bibliography (annex b)
Below is a diagram of a typical ridge tent and its component parts.



8.2 standards and specifications

At the time of writing, there is no internationally agreed standard family relief tent. The United Nations Inter Agency Procurement Services Office (IAPSO) however, lists three types of tent in their procurement catalogue (annex b). Performance standards and indicators for the design of tents are included in **part C**. Procurement specifications of some of the major relief agencies can be found in the procurement/logistics catalogues listed in **annex b.**

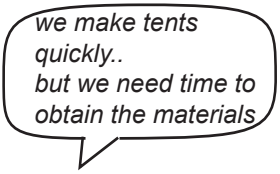
The standards provided by the International Organisation for Standardization and similar standards organisations are not generally targeted at relief tents. However, some of these standards have subsequently been adapted by some organisations for the testing of tent fabrics.

8.3 manufacture

Canvas is woven and then often treated for rotproofing and fire retardation. Large-scale tent manufacturers weave and treat their own fabrics. Tents are sewn from the treated fabric using sewing machines.

capacity and lead time

At the time of writing, the majority of tents for emergency relief are made in Pakistan. The largest manufacturers can nominally produce up to 1,000 tents per day. Demand for tents may rise rapidly following emergencies, so delivery times may vary. Production can also be slowed by limited availability of source materials such as raw cotton.



ethical purchasing

Working conditions and especially occupational health vary considerably in tent manufacturing, but are often poor for most emergency tents. Considerations such as the use of child labour should also be compared with the ethical procurement requirements of agencies.

8.4 fabrics

A standard tent with a flysheet and a groundsheet will need about 70 m^2 of fabric. One tent may have different fabrics for each part of the tent.

the area of fabric in a family tent is the same as 20 blankets..

Tents are often made of three different fabrics. One for the outer tent and flysheet (sect. 8.4.1), one for a lining and one for the valances/mudflaps.

8.4.1 fabrics: outer tents

The outer tent fabric provides protection from the sun, the wind and the rain and in many tent designs helps to hold the tent up. The choice of fabrics with suitable strength and durability is critical to tents' longterm use.

flysheet

inner tent

fabric types

At the time of writing, most tents are made from **cotton canvas**. It is expected that in the future, an increasing number of tents will be made from **synthetic materials** such as polyester, Polyvinyl Chloride (PVC) coated polyester, or **plastic sheeting**.

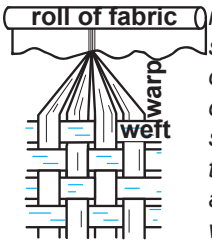
tents of the future will use newer materials

cotton canvas

cotton canvas is usually made from pure cotton or a mixture of cotton and polyester, **polycotton**. The composition of polycotton canvas varies between 30% and 50% polyester. The strength and durability of cotton canvas is dependent on the quality of the source cotton as much as the quality of the weaving of the canvas.

canvas: weave

The weave on tent canvas is generally “plain”. Many of the large tent producing factories are not able to produce more complex or stronger weaves. Military tents use ripstop canvas but are more expensive.



magnified section of fabric on the roll showing the warp and the weft

warp and weft
Woven fabrics such as cotton canvas are made on a loom. The warp threads are the lengthwise threads whilst the weft are the cross threads. Cotton fabric specifications commonly specify the type of thread used and the number of threads per cm (or per inch) in both the warp and weft directions.

canvas: strength
International standards for fabric strength do exist but are expensive to physically test and may not be understood by manufacturers. The strength of cotton canvas is most commonly defined by defining the thread thickness, the weaving density, the weight of the canvas and the use of qualitative phrases such as "*free of defects and faults adversely affecting strength, waterproofness and durability.*"

canvas: fireproofing
Tent fabric is seldom made fireproof as treatments are expensive and can be toxic (sect. 9.2). Fabric can be made fire retardant more cheaply than it can be made fireproof.

canvas; waterproofing
The performance of waterproofing is generally defined by the test of the canvas being able to withstand a column of 20-40 cm of water. The most common waterproof treatment for cotton canvas is paraffin emulsion and alum acetate.

canvas: weight
Heavier weight canvases are generally more durable than lighter weight canvases. The basic weight of the fabric is usually less than the finished weight of the fabrics. This is due to the addition of chemicals and waxes for rot and waterproofing.

canvas: rot proofing
Rot proofing treatments vary. The traditional method is treatment with copper napthanoate, which gives cotton canvas a greenyblue tinge. The final percentage of the dry weight of the canvas varies between 0.05 and 0.35 per cent. The addition of too much rot proofing agent can weaken canvas fabric. More effective and newer anti-rot treatments exist but can be expensive; a cost that should be balanced against storage issues.

resistance to UV
Fabrics should not decay under sunlight. Formal tests exist to test fabric, although these may be slow and expensive to conduct. Practically it is simplest to compare products over time by leaving fabric samples in the sun.

plastic sheeting
There are many types of plastic sheeting available (Howard and Spice, annex a). Where used, plastic sheeting should conform to UNHCR/Médecins sans Frontières (MSF) 1997 specification for which standards have been internationally agreed (International Committee of the Red Cross (ICRC) emergency items catalogue **appendix a**). This plastic sheeting is made from woven high-density polyethylene (HDPE) black fibre fabric laminated on both sides with low-density polyethylene (LDPE) coating. It is reinforced with four bands.

8.4.2 fabrics: tent lining

Currently, canvas tent are most frequently lined with a *desouti* or cotton lining. This is generally a looser weave and a lighter fabric than the material used for outer tents. Generally *desouti* linings weigh about 150-200 g/m^2 and are dyed with a colour which should not run with water.

alternative materials
At the time of writing, only a few alternatives to cotton have been tried and used:
- plastic woven cloth liners covering a double-blistered 8 mm aluminium alloyed foil layer of insulation have been used for some tents
- insulation layer of 4 mm non-woven Terrylene weighing 500 g/m^2
- polyester padding between the inner tent and the flysheet.

Alternative materials for tent linings are currently in development. The major effect of a tent lining is to reduce heat loss through air leaks. Thick layers of insulation do not generally perform markedly better than thin layers of insulation.

8.4.3 fabrics: valance/mud flaps

definition and use
The valance is a rot proof skirting or "mud flap" at ground level. This allows tents to be dug into the ground. Tents should be dug into the ground in addition to being pegged (sect. 7.6). This can add up to 1/2 ton of soil to hold the tent down. Digging the tent into the ground also reduces wind leakage into the tent.

valances stop the tent from rotting at the ground

Rot-proof valances are important, as the canvas tends to be wetter and hence more prone to mildew and rotting where the tent reaches the ground.

width
Valances should be at least 40 cm wide. This is wide enough to protect the base of the tent and to be solidly dug in to stabilize the tent and reduce air draughts at low level.

Materials
Valances should be rot proof and able to withstand prolonged exposure to sunlight. The cheapest plastic sheeting will decay. Commonly used materials are polyester canvas, PVC-coated canvas and woven polypropylene.

8.4.4 fabrics: groundsheet

design
Groundsheets are either:
- separate from an inner tent – giving occupants control over how to use the groundsheet
- sewn in as an integral part of the tent – giving wind and water proofing where the tent has not been trenched into the ground, but forcing people to cut tents when adapting them (sect. 6.1).

They are:
- flat sheets-generally 10 per cent larger than the floor plan of the tent, or
- box shaped-being the same size as the floor plan of the tent, and sewn into the tent lining itself.

materials
The following materials are commonly used
PVC coated canvas - 500 g/m2
- PVC (nylon 400-450 g/m^2)
- woven polypropylene covered on both sides with LDPE – finished weight 175-200 g/m^2 . Edges folded and sewn
- canvas covered with PVC 500 gm^2
- waxed cotton canvas, 440 $gm^{2.}$.

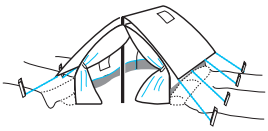
8.4.5 fabrics: stitching

Most fabrics are stitched together with thread. Some synthetic fabrics can be heat welded, which can be stronger if fabricated well. However welded joints can be hard to repair if they break.

A procurement specification (such as that in IAPSO, annex b) may contain the type and length of stitching, the width of the hems, and the type of thread. Alternatively, specifications might define the strength of the seams.

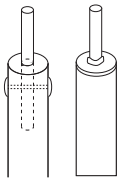
8.5 poles

Poles are generally made from galvanized steel or aluminium pipe. The only exceptions being the OXFAM tent, which uses standard MDPE water pipe, and the high walled centre pole tent, which uses bamboo poles for the walls.



The diameters of the galvanized pipes are all in the ranges below:

- 28 mm diameter with 1 mm wall thickness
- 48 mm diameter, 1.5 mm wall thickness.



Care needs to be taken with the joint between the spike and the pole. Welded joints are particularly prone to failure.

8.6 ropes and fixings

ropes

Rope must not decay under sunlight. A specification for suitable rope may read: "*UV treated nylon or polypropylene, braiding 9 mm 3 Strands, tensile strength at least 300 Kg, runners 5 mm diameter galvanized steel, approx 11 cm long.*"

fixings

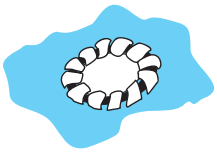
The most common fixings of ropes to the tent are either through:

- D rings, which should be galvanized steel
- strengthening galvanized steel circular rings sewn on the inside of a hole.

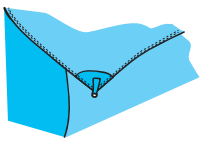
strengthening patches

In some parts of tents, where there are additional stresses such as where the wall, roof and doorways are joined, strengthening patches are required.

D ring for attaching ropes



galvanized circular ring sewn to strengthen hole



patch to strengthen canvas at attachment point

eyelets

Eyelets can either be brass or galvanized. Poorly galvanized eyelets are prone to rust, causing the fabric to stiffen and weaken.

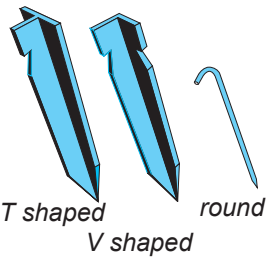
8.7 pegs

There are two categories of pegs used in tents, these are **large pegs** and **pins.**

- pegs should be made from one piece of steel or aluminium. They should not be welded, as welds often break
- pegs may be painted or galvanized to stop them from rusting
- pegs can become sharp and dangerous where they have been hit by a hammer
- tent pegs can be improvized in the field with sections of concrete reinforcement bars or wooden stakes.

large pegs

These are used for fixing guy ropes to the ground, the cheapest are generally T or V shaped for strength and up to 50 cm long of 2 mm thick steel. It is best if they are notched to hold the rope. However, some agencies prefer round pegs, which are less likely to become sharp and dangerous. Poor quality round pegs are more likely to bend.



pins

Pins are used for fixing an inner tent to the ground. These are shorter than the pegs. They are generally too small for use as pegs for guy ropes.

In some hoop tents, there is no need for pegs as they have no guy ropes. Most tents are further secured to the ground by burying of the valances.

8.8 design details: doors, flues and windows

windows

The size, covering and closing system for windows varies between tents. Most commonly they have a canvas flap that can be lowered to close the window. Generally windows are covered by mosquito nets. In some tents, windows are made from shatterproof transparent materials.

ventilation

In addition to windows, some tents have vents in the roof or at the ends.

doors

The fastening mechanism for doors varies. Generally zips and velcro as the only closing mechanism should be avoided:

- lacing, using sewn loops of rope to lace the tent shut
- zips. Good zips are very expensive - often approaching the cost of an emergency tent. Cheaper zips often fail, leaving doors that flap open
- toggles and buttons (two rows on each door).

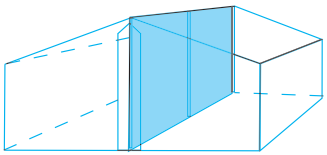
It is important to leave a significant overlap defined at the door so that the fastenings are not under tension. Very large overlaps are particularly suitable for tent linings.

flues

Flue holes are important if a stove is to be placed inside a tent. Dimensions of flue pipes commonly vary from 8 - 10 cm. The pockets that the flue plates slide in are generally larger. Flue plates should measure approximately 40 x 40 cm. (sect. 5.3)

pockets and partitions

Tents may have useful storage pockets for occupants. They may also have a movable screen to split the tent into compartments for improved privacy.



mosquito nets

Tents may include mosquito netting on windows, vents and doors. To be useful these must reach to the floor, be strong and not weaken with exposure to ultraviolet light (sunlight).

8.9 packing and labelling

The packing and labelling depends on agency policies. The critical issues are whether:

- The agency name is displayed on the side of the tent or on the bag. This can aid with dissemination, but can lead to the agency's name being incorrectly used if the tents are subsequently used out of context, such as soldiers using a tent for a checkpoint
- The manufacturers name is displayed on the side of the tent. This makes it easier to trace the tent
- Batch and delivery number is displayed on the tent or on the bag.

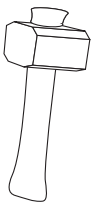
The following is an example of a packaging description:
The tent should be folded and rolled with all accessories wrapped in canvas cloth inside the bundle. It should be polyethylene lined, wrapped with strong Hessian cloth and stitched and strapped with nylon bands in both directions.

Frequently the packaging that the tents are delivered in is useful to people.

Additionally packaging may specify that the tent bag contains a

- drawing or picture of contents
- description of contents in key languages; English, French, Spanish
- manual on putting the tent up (often a photocopied sheet of paper, preferably laminated or in a plastic sleeve)

8.10 hammers and repair kits



Hammers are important when pitching tents on hard ground. Hammers are also useful to the people who are being given the tent. Hammers need a **strong handle securely fastened** to the head of the hammer, for example using a wedge. Hammers need to weigh at least 1 kg to be of any use. Other tools required for erecting tents are discussed in section 4.3.

A repair kit might consist of:

- strong needles, one straight and one curved
- at least 20 m of strong, rot proof and waterproofed thread for repairs
- a small section of spare tent material to repair tears.

9 performance standards for tents

9.1 introduction

This section contains performance **standards** for tents, as well as indicators that these standards have been attained. The standards and indicators are wholly consistent with Sphere and UNHCR standards (annex b), which they build upon.

These first standards have been reviewed by key humanitarian organizations, including:

donor organizations

Conflict and Humanitarian Affairs Department Operations Team (DFID CHAD-OT)
European Commission Humanitarian Aid Office (ECHO)
Japan International Cooperation Agency (JICA)
Swiss Agency for Development and Cooperation/Swiss Humanitarian Aid Unit
United States Agency for International Development/Office of United States Foreign Disaster Assistance (USAID OFDA)

United Nations organizations

United Nations Development Programme (UNDP)
United Nations High Commissioner for Refugees (UNHCR)
United Nations Human Settlements Programme (UN-Habitat)
United Nations Office for the Coordination of Humanitarian Affairs (UN/OCHA)
United Nations Office for Project Services (UNOPS)

international organizations

International Committee of the Red Cross (ICRC)
International Federation of Red Cross and Red Crescent Societies (IFRC)

non-governmental organizations

Catholic Relief Services (CRS)
Community Housing Foundation (CHF)
GOAL
Médecins Sans Frontières, Belgium and Holland (MSF-B/NL)
Norwegian Refugee Council (NRC)
Oxfam GB
Registered Engineers for Disaster Relief (RedR)
Shelter Now International / Shelter for Life (SNI/SFL)

9.2 performance standards and indicators

In the tables below, **standards are indicated in bold black** typeface, while indicators of meeting those **standards** are indicated below in blue typeface.

These performance standards do not offer detailed technical specifications for materials or components*, which should be developed for each procurement. The ICRC logistics catalogue contains laboratory tests for fabrics (ICRC 2003, Appendix B). Wherever possible, and without undermining the validity of the standards, the standards and indicators offered are for field use and do not require laboratory testing. Terms used are consistent with the glossary (Appendix B).

a	logistics standards and indicators **tents should minimize logistics requirements and costs, while maximizing the logistics options for their transport**	
a1	**total weight**	**tents should be as light as possible**
a1.1		40 – 60 kg for a non-winterized tent with a liner
a2	**packed volume**	**packed, the tent should occupy the minimum volume possible**
a2.1		0.3-05 m^3 packed volume for a non-winterized tent with a liner
a3	**packed size**	**tents should pack to a sensible size for transport**
a3.1		tents should pack to less than 2 m in length
a3.2		tents should fit on a euro pallet 120 x 80 cm, however, if stacked vertically, the packed height of the tent should be less than 2 m
a4	**storage**	**it should be possible to stockpile tents without degradation**
a4.1		5 years minimum, without degradation

*the term component in this instance includes structural members, joints, coverings, liners, guy ropes, pegs, and groundsheets

b	physical standards and indicators tents should be appropriate and safe for full-time occupation by a family	
b1	**usable area**	**tents should be large enough for a family to live in**
b1.1		meet UNHCR and Sphere standards for covered living space of 3.5 m2 per person: - 21 m² for a tent classed for a family of six - 17.5 m² for a tent classed for a family of five - 14 m² for tent classed for a family of four
b2	**usable volume**	**tents should be in a form appropriate for constant use**
b2.1		33 per cent of total floor area should have 1.8 m minimum head height
b3	**durability**	**the structure and covering provided by tents should be durable**
b3.1		the structure and covering must be capable of 18 months continuous usage
b3.2		the covering must meet Ultra Violet light resistance standards of plastic sheeting: maximum 5 per cent loss on original tarpaulin tensile strength under ISO 1421 after 1500 hours UV under ASTM G53/94 (UVB 313 nm peak), to be tested outside and inside reinforcement bands (ICRC standard 2003)
b3.3		able to withstand a temperature range of 25 ºC to 45 ºC without structurally weakening
b4	**integrity**	**the structure and covering should be able to withstand the most extreme weather conditions that can reasonably be expected**
b4.1		the structure should have sufficient redundancy so that if the covering or one fixing fails, the tent will remain upright
b4.2		the tent should not fail in wind speeds peaking at 75 km/h (21 m/s), or Force 8 on the Beaufort Scale (Gale Force)
b4.3		water should not leak through the covering under any conditions

b5	**flooring**	**tents should be supplied with appropriate ground sheet or flooring**
b5.1		water should not leak through the ground sheet under any conditions
b5.2		insulating flooring, rugs or mattresses should be made available to tent beneficiaries in temperatures averaging below 0 ºC overnight
b6	**ventilation**	**the ventilation of tents should be adaptable by beneficiaries**
b6.1		doors, windows and vents should be openable to control heat gain or loss
b6.2		an opening in the tent should maintain minimum ventilation, to prevent suffocation and reduce the risk of morbidity resulting from air pollution and communicable disease
b7	**fire safety**	**people should have time to escape from a burning tent**
b7.1		the tent should have two opposite openings to facilitate escape in the event of fire
b7.2		it should be possible to exit the tent within two minutes when all doors are fully closed
b7.3		a flame from a cigarette or match should not spread across the entire covering or structure
b8	**vector control**	**measures should be taken to protect inhabitants from mosquitoes, flies and other disease vectors**
b8.1		where used, mosquito nets should be sealed at the ground and cover all openings

b9	**environmental toxicity**	**tent component materials should not be toxic to fabricators, inhabitants, or the environment**
b9.1		tents should not involve materials that are toxic to beneficiaries, even when cut or modified for later re-use
b9.2		when disposed, tents should not involve materials that are toxic, by burning or burying, and should not pollute the ground water table or enter the food chain
b9.3		there should be minimal negative environmental impacts from the manufacturing or disposal of tents
b10	**colour**	**tents should be of an appropriate colour, both inside and outside**
b10.1		cultural and political sensitivities should be taken into account, for example in the use of colours used in national or factional flags
b10.2		military or camouflage colours should not be used
b10.3		tents must admit adequate daytime light for reading

c	social standards and indicators tents should be suited to the needs of occupants	
c1	**buildability**	**tents should be easy to put up**
c1.1		instructions for assembling the tent should be packed with each tent, or printed on the tent or tent bag, including both illustrations and descriptions in appropriate languages
c1.2		it should be possible for a minimum of two adults to assemble the tent without involving any intricate sequence of construction
c1.3		the tent should be distributed complete, ready to put up, with all components included and all appropriate tools
c2	**repairability**	**tents should be reparable by beneficiaries and allow occupants a reasonable degree of adaptation to better suit their needs**
c2.1		the number of different types of components should be kept to a minimum
c2.2		the number of components should be kept to a minimum
c2.3		components should be interchangeable where possible
c2.4		components should be available locally, or appropriate materials, tools and skills should be available for their local manufacture
c2.5		repairs should be possible with non-specialist skills and equipment
c2.6		tents should include a repair kit, with appropriate tools, spare components and material
c2.7		some component materials used should be suitable for later re-use, upgrading, modification or reconstruction on return

c3	**adaptability**	**tents should be adaptable by beneficiaries and allow occupants a reasonable degree of adaptation to better suit their needs**
c3.1		the minimum of obstacles, such as poles and guy ropes, should be placed in entry areas to make the adaptation of space for childcare and cooking easier
c3.2		common patterns of adaptations of tents should be considered and supported in the design of the tent, including mud brick side walls
c4	**modularity**	**it should be possible to connect tents together easily, so that more than one tent can be distributed to accommodate larger beneficiary families**
c4.1		there should be connection points in the covering, and ideally in the structure, appropriate to connecting tents of the same type
c4.2		connecting points should also take into consideration the adaptability of the tent for use with tents of other types and for expansion or upgrading with locally-available materials
c5	**privacy**	**tents should provide a suitable level of privacy to beneficiary individuals within a tent**
c5.1		it should be possible to sub-divide the internal volume
c5.2		when made available, vestibule spaces should increase visual privacy

foreword
contents

part A
using tents

part B
technical

part C
standards

annex

The annexes contain a glossary and further reading

annex a glossary

collective centre	shelter where a group of people are accommodated together in one place. These are normally in urban areas and are often intended as temporary or transit accommodation
component	structural members of a tent, joints, coverings, liners, guy ropes, pegs, and groundsheets
desouti	lightweight cotton fabric used for lining tents
HDPE	high-density polyethylene
ICRC	International Committee of the Red Cross
MDPE	medium-density polyethylene
MSF	Médecins sans Frontières
Non food item	articles for distribution to beneficiaries that meet part of their shelter needs, such as blankets, mattresses, mosquito nets, stoves and fuel
OCHA	Office for the Coordination of Humanitarian Affairs
polycotton	polyester cotton mix
polyester	a synthetic polymer commonly used in making fibres
polyethylene	a common type of plastic produced from ethylene and used in the making of pipes, foil and packaging material
polypropylene	a thermoplastic material similar to polyethylene but somewhat stiffer and with a higher softening point

PVC	polyvinyl chloride. A plastic that is used for many purposes. There is concern over the various additives including lead and cadmium that are added to PVC to make it usable
shelter	a habitable covered living space, providing a secure, healthy living environment with privacy and dignity to those within it
sheltering	the process of providing shelter
settlement	a community of covered living spaces providing a healthy, secure living environment with privacy and dignity to those groups, families and individuals residing within them
terylene	a synthetic polyester used as a textile fibre
tent	a self-contained shelter, normally consisting of poles, pegs, ropes and tailored material
UNHCR	Office of the United Nations High Commissioner for Refugees
UV / ultraviolet	Light rays that are outside the visible spectrum at its violet end. Wavelengths are in the range 380nm to 5nm.
valance	the fabric at ground level of a tent. Also known as a mudflap
vulnerable people	physically, mentally, or socially disadvantaged individuals or groups
warp	term used in weaving for the threads that run along the length of the roll of fabric
weft	term used in weaving for the threads that run across the roll of fabric

annex b further reading

shelter guidelines

shelterproject, Transitional Settlement: Displaced Populations, 2004 (www.shelterproject.org)
Guidelines aimed at strategic planners and implementers of settlement responses. Considers settlement options for displaced populations

The Sphere Project, The Humanitarian Charter and Minimum Standards in Disaster Response, 2004 (www.sphereproject.org)
Sets out what people affected by disasters have a right to expect from humanitarian assistance. Includes shelter and settlement planning, with standards, indicators and checklists.

Office of the United Nations Disaster Relief Co-ordination (UNDRO, now OCHA) Davis, I. Shelter After Disaster; Guidelines for Assistance, UNDRO, 1982
(www.reliefweb.int/library/documents/2003/undro-shelter-jul82.htm)
Guidelines and description of shelter provision in all aspects of natural disasters (from preparedness to reconstruction).

Office of the United Nations High Commissioner for Refugees, (UNHCR) Handbook for Emergencies, UNHCR, 1999 (www.unhcr.ch)
A managers' guide to setting up emergency operations for large-scale influxes. Provides advice on how to tackle various aspects of emergency response.

technical resources

Davies, J. and Lambert, R. Engineering in Emergencies, RedR, 2003,
A technical manual on field engineering. Contains two chapters on settlement and shelter. Contains practical information for the field engineer.

Howard, J. and Spice, R. Plastic Sheeting, Its Use for Emergency Housing and Other Purposes, Oxfam Publishing 1988
A short technical booklet on plastic sheeting, its procurement and its uses.

Médecins sans Frontières, (MSF), Refugee health, Macmillan, London 1997
Consideration of emergency health issues.

UNHCR, Cooking Options in Refugee Situations, A Handbook of Experiences in Energy Conservation and Alternative Fuels, 2002
A summary of practical ideas for domestic energy use in refugee situations.

procurement catalogues and specifications

IAPSO (Inter Agency Procurement Service), Emergency Relief Items-Compendium of Generic Specifications, vol. 1 (www.iapso.org)
Detailed procurement specifications for canvas tents as well as other non food items

ICRC/IFRC (International Committee of the Red Cross/International Federation of Red Cross and Red Crescent Societies) Emergency items catalogue, 2002, ICRC, Geneva.
Contains description of performance testing of tent canvas and description of tents as well as other non food items

Médecins sans Frontières, (MSF), Catalogue, 2002.
Includes MSF tent specifications as well as details of other non food items.

This document is available at the following websites for download:

http://ochaonline.un.org/lsu
http://www.shelterproject.org

For more information, comments or queries, please contact:

Office for the Coordination of Humanitarian Affairs
Emergency Services Branch / Logistics Support Unit
Tel. (+41 22) 917 1234
email lsu@un.org