Plastic sheeting: its use and procurement in humanitarian relief

Plastic sheeting is one of the most widely used and distributed Non-food Items in humanitarian relief. It is a highly adaptable material with many uses in many different sectors.

This technical brief focuses on when to use, how to use and fix plastic sheeting as well as summarising its procurement.

What is plastic sheeting?

Plastic sheeting (also known as plastic tarpaulin, tarp, or polythene sheet) is a sheet of strong, flexible, water resistant or waterproof material. Plastic sheeting suitable for humanitarian relief is made from polyethylene.

Although there are many types of plastic sheeting available on the market, not all are suitable for relief distributions because of their lack of resistance to sunlight or the lack of strength.

Standard sheet has a black woven or braided core and is laminated on both sides. All plastic sheeting must reach minimum performance standards.

The anticipated lifetime of plastic sheeting is less than 2 years. It is often used to cover emergency shelter and sanitation needs until more durable solutions are found.

Plastic sheeting is not a building solution on its own. It must be combined with local materials and tools to provide structure and fixings.

When to use plastic sheeting

- Is the construction project necessary?
- Is there a plan for maintenance / handover?
- Are the sites appropriate for the construction?

Have you considered these issues?

- Are more durable building materials available in local markets?
- Would tents be a more appropriate form of shelter?
- Will plastic sheeting provide adequate protection from the weather?
- Will plastic sheeting be the only shelter response by your organisation?
- Will delivery be in time to meet emergency needs?
- Have you included international freight costs in your budgets?
- Will the use of plastic sheeting compromise the needs of women and vulnerable individuals?
- Are people likely to sell, rather than use the plastic sheeting?
- Are other organisations working in the area also planning to distribute the same quantities of plastic sheeting?

What will the sheeting be used for?

- Fencing, shading
- Latrines, fencing, floors, walls, roofs, etc.
- Window repair

Who will be building with the plastic sheeting?

- Beneficiaries
- Direct build / contractors

Fixings

- Procure appropriate fixings / or kit of fixings

What size sheets do you need?

- 4m x 5m
- 4m x 6m
- 4m x 7m

Are adequate fixings available?

Standard plastic sheeting

Outer: sheet of polyethylene lamination sheet
Inner: woven black polyethylene
Outer: sheet of polyethylene lamination sheet

The illustration shows a section of plastic sheet with outer layers peeled away.
Using plastic sheeting

Some of the uses of plastic sheeting

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Using plastic sheeting: Shelter

Shelter is a habitable, covered living space. **Shelter is more than just a roof.**

For a space to be habitable, it must offer protection from the elements and have access to water and sanitation.

Plastic sheet, plus poles and fixings.

Various uses of plastic sheeting in kits and basic shelters are illustrated below. Although these structures are not ideal, they are commonly required to meet emergency needs following conflict or disasters.

Plastic sheeting can be used in cold climates to create a thermal buffer zone, windows and for emergency upgrading of tents.

Using plastic sheeting: Sanitation

The primary objective of sanitation programmes in disasters is to provide dignity for people and to reduce the risks associated with faecal-oral diseases.

Sanitation is more than a latrine

Construction on its own will not solve all sanitation issues. Ensure that disaster-affected people have the necessary information, knowledge and understanding to prevent disease from poor sanitation.
Example: A basic superstructure for latrine or washroom

**Structure**
- Solid timber poles (6x3m)

**Cover**
- Plastic sheet, 6x3m (cut in half)

**Fixings**
- Domed head nails (1kg)
  or nails and battening

Example: A superstructure for latrine / washroom using plastic sheeting
Building blocks of latrines can save materials but it can be harder to encourage ownership and keep them clean.
Aim for a minimum of one latrine per twenty people

**Structure**
- Timber (0.1m^3)
- Nails (3Kg)

**Cover**
- Plastic sheet (6.5m^2)
- Domed head nails (1kg) or nails and battening

Example: Use of plastic sheeting as temporary but washable latrine slab

Using plastic sheeting: Infrastructure
Plastic sheeting is commonly used in the repair or construction of temporary buildings for use as clinics, schools, community centres, distribution or registration centres, way stations, offices, or warehousing. It is also commonly used for covering of materials and fencing.
When plastic sheeting is to be used for infrastructure purposes by organisations or contractors, it is easier to use by the roll than in individual sheets.

Shadenet
Shadenet should be encouraged as a cheaper (but durable) alternative to plastic sheeting for fencing and for the provision of shade in hot climates.
(Further reading: [Shade Nets – MSF, Shelter Centre](#))

Fixings
Once good plastic sheeting has been procured, the main principles to observe when fixing plastic sheeting are:
1) Spread the load
2) Prevent the sheeting from flapping
3) Avoid contact with points of friction
4) Avoid Hotspots

1) Spread the Load
Fixings of plastic sheeting must be spread over a large area to prevent them from pulling through.

Reinforcement bands
If plastic sheeting with reinforcement bands is available, fixings should pass through the bands to add strength to the fixings.

Fixing to the ground
When plastic sheeting is connected directly to the ground, 50cm of additional plastic is required on each side for burying in trenches. If timber is available, then the plastic sheeting can be nailed to timber runners that are pegged to the ground (or connected to the foundations).
Whilst sandy soils will not grip the plastic sheeting as well as other soil types, it may be very difficult to dig
trenches in some rocky soils. Choosing a method for fixing the sheeting to the ground therefore depends upon the soil conditions as well as the availability of materials.

**Fixing to rope: Rock and stone**
A strong way of fixing rope to plastic sheeting is to fold a smooth stone (minimum 3cm diameter) inside the plastic sheeting and tie rope or strong cord behind it. This can cause sheets to crease which can make them flap in the wind.

- **Stronger**
  - Use a smooth stone or tie a corner to attach the plastic sheeting to a rope.

- **Weaker**
  - Tent pegs do not spread the load.
  - Dig a trench and cover with earth.
  - Wrap plastic around rocks and bury it.
  - Wrap plastic around timber and bury it.
  - Wrap around timber and nail to pegs.

**Fixing to rope: Reinforcement bands**
Plastic sheeting either comes with reinforcement bands or with eyelets fitted. The reinforcement bands are usually grey or blue. Sheetings can be fixed by cutting a small hole in the reinforcement band and tying thick cord through it. Where eyelets are used, they must be of good quality and well fitted.

- **Strong**
  - Use of a good quality eyelet to attach plastic sheeting to a rope.
  - Thick rope through a hole in the reinforcement band.

- **Weak**
  - Rope through a hole in the sheet - outside the reinforcement band.

2) **Keep sheeting tight**
When plastic sheeting is not tight, it flaps with the wind and can collect water puddles. This is both noisy and damages the plastic sheeting. To avoid flapping, always encourage people to pull plastic sheeting tight when building with it.

**Ponding and puddles**
With poorly designed roofs, puddles of water can collect on the plastic. These puddles can break the roof, cause the plastic sheeting to stretch, increase the likelihood that roofs will leak, and can become breeding ponds for mosquitos.

3) **Avoid sharp points**
Plastic sheeting is easily punctured by sharp points or worn away by rough surfaces (especially if it is not fixed tightly). When building a frame for plastic sheeting ensure that all nails are flush with the timber. Ensure that edges and rough surfaces that will be in contact with the plastic have been smoothed. External objects such as tree branches can puncture plastic sheeting.

4) **Avoid hot spots.**
Plastic sheeting will get hotter where it is stressed over any structure that will hold and release heat, especially metal or black surfaces. This can cause the plastic to weaken and break. Prevent sheeting from overheating at contact points by:
- Designing structures to reduce the number of contact points.
- Covering the plastic sheeting with opaque adhesive tape on the outside of the cover.
- Painting the plastic sheeting with aluminium or bitumastic paint at the contact points.
- Covering the structure with light coloured insulating material.

**Procuring plastic sheeting**
The quality of plastic sheeting is impossible to identify by visual inspection, specifically with regards to durability under sunlight. For this reason, plastic sheeting is commonly procured in bulk by head office to very precise specifications. However, regional and headquarters staff should proactively identify regional sources of good quality sheeting in preparedness rather than at the time of a crisis. Plastic sheeting can be bought and stored as contingency stock.

See the Oxfam Supply Centre equipment catalogue pages for plastic sheeting. Information and specifications from ICRC, IOM, and Shelter Centre are available.