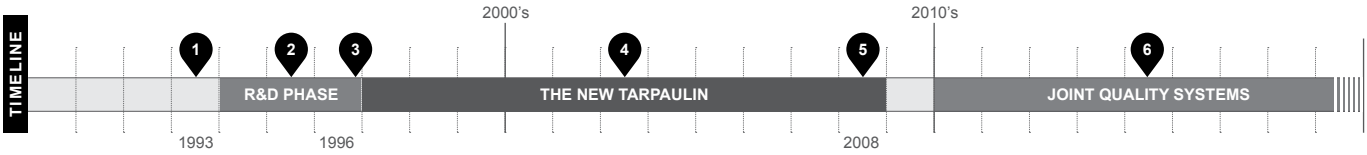
CASE STUDY HUMANITARIAN TARPAULIN DEVELOPMENT

KEYWORDS: Plastic sheeting, Specifications, Cost-effectiveness, Quality control, Procurement and supply

CRISIS	**Humanitarian crises worldwide**
PROJECT OUTPUTS	The design of a standard tarpaulin for emergency shelter and the set-up of the appropriate system to guarantee quality in the long run
USES OF THE TARPAULIN	Emergency, temporary shelters, and multiple other functions
MATERIALS COST	**USD 12–20** per tarpaulin, including transport

PROJECT SUMMARY

By working with an inter-agency working group and by establishing clear quality control processes throughout the global supply chain for non-food items, the organization was able to improve quality, pricing and timeliness of a major relief item: the tarpaulin. Processes included research and development, active sourcing to identify manufacturers, factory visits to ensure that social and environmental conditions were adhered to, common specifications developed on an inter-agency basis, and scientific sampling. The organization's quality control systems have led to more than USD 1.5 million of penalties (for suppliers) and savings (for agencies). But more importantly, the focus has been on building relationships with manufacturers so that they better understand the needs, and that agencies can provide items of suitable quality and durability to vulnerable crisis-affected people.



1. 1993: **Organizations decide to collaborate to design the tarpaulin.**
2. 1994–1996: **One technical unit takes in charge the inter-agency research and development (R&D) project.**
3. 1996: **Final specifications are set for the inter-agency standard tarpaulin.**
4. 1996–2008: **Procurement takes over and a shift to the new product occurs.**
5. 2008: **Quality issues in procurement appear year after year.**
6. 2010–onwards: **Organizations decide to join their efforts to set quality systems. The QSE working group is formed.**

STRENGTHS

+ Inter-agency collaboration to develop shared processes.
+ Universal applicability of the standard specifications.
+ Cost-effectiveness and speed of production.
+ Improved product quality and factory working conditions.
+ Durability of the items better serve the needs of affected people.

WEAKNESSES

- Lack of research and development funding and capacity in agencies.
- Low capacity to retain product development history.
- Challenges in maintaining consistent quality control systems.
- Standard tarpaulins are not easily available in many countries.
- Different standards are still used across agencies and operations.
- Many agencies insist on branding, reducing stock interchangeability.

The project established joint standard specifications for the most commonly used relief item: the tarpaulin. Simple tests on size and tear strength can be easily conducted in the field. These ensure quality is up to standard, and to apply penalties to suppliers for non-conformities.

BACKGROUND TO THE PROJECT

When people's homes have been destroyed, using plastic sheeting is a fast and easy way to create an emergency shelter – a shelter that will shield them from the rain, the sun, the cold; that will protect them from disease outbreaks and offer them some privacy.

For humanitarian relief workers, plastic sheeting is indispensable – not just for shelters. It can be used to make fencing or walls for latrines; it can be spread on the ground when sorting out emergency food rations; it can be used to cover the food when fumigating against insects… It can even be made into guy-ropes to secure large tents, as it is extremely strong, with very high tensile strength.

But it was not always so dependable. When aid organizations first started using plastic sheeting in the 1970s, they used agricultural film, which was unreinforced and very fragile. There were also a diversity of products and qualities, making comparison and tendering challenging.

Moving on from polythene film, agencies began to purchase the kind of cheap plastic sheets that can be found in a supermarket. These cost just USD 0.20 per square metre, but tear easily and the polyethylene is very sensitive to the ultraviolet rays in sunlight. As a result, they degrade very fast. After just a couple of weeks in the strong sun of South Sudan, the plastic turns into powder.

EARLY HIGH-QUALITY PRODUCTS

Humanitarian agencies began to procure plastic sheets from one Danish company which was making very high-quality products out of thick plastic with braided reinforcement inside, with plastic eyelets every metre. But the problem was the price. These cost USD 1.5 per square metre – or USD 36 for a 4x6m sheet – which was expensive, particularly as agencies were purchasing tens of millions square metres every year. As the product was under patent, agencies were unable to find competitors, nor they could open tenders to get more competitive pricing.

Effective covered areas are smaller than plastic sheets themselves.

5x4m sheet: 13.5m² effective covered area (without walls).

6x4m sheet: 16.5m² effective covered area (without walls).

7x4m sheet: 19.5m² effective covered area (without walls).

(examples based on 30⁰ pitched roof allowing 25cm each side for fixings.)

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Poor-quality plastic sheeting in the field. This product can last just a few weeks when exposed to the elements.

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Suppliers started producing the new tarpaulin in the late 1990s. The use of reinforcement bands instead of eyelets allows for mechanization, increasing quality and speed of production.

DEVELOPMENT OF COMMON SPECIFICATIONS

In the late 1990s, a consortium of organizations decided to start from scratch and write their own specifications, which they would take to the international market, so companies could bid to manufacture the product accordingly. Many tests were performed with different samples of plastic sheeting, including new and used tarpaulins from the field.

With support from laboratories and shelter specialists, technical specifications were designed based on standards from the International Organization for Standardization (ISO standards). The specifications included required parameters such as material composition (a black woven polyethylene with exterior laminations), strength in both directions, details of the reinforcement bands, etc. These allowed quality control testing in certified laboratories using standardized tests. In this way, manufacturers could know what was expected of their products, and agencies could control samples received. Field testing methodologies were also developed based on the ISO standards, as a way of conducting rapid quality control on samples in the field.

SOURCING

After the initial research spread over three years (1996–1998) and with a final specification, it was possible to identify companies to manufacture high-quality plastic sheeting in China and Korea, at the cost of USD 0.40 per square metre at factory door. This was a significant reduction. From the 2000s, the product was also produced in India, Pakistan and Kenya.

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A good-quality tarpaulin can resist up to a year or longer. It can be used for multiple purposes, such as covering older plastic sheets to provide waterproofing.

CONTINUAL REVISION OF SPECIFICATIONS

Over the years, the specifications were continually and incrementally revised, thanks to feedback from the field and laboratory testing. Changes were as diverse as weight or colour of reinforcement bands (from blue to grey, to prevent the tarpaulins being confused with national flags), based on improvements of manufacturing technologies.

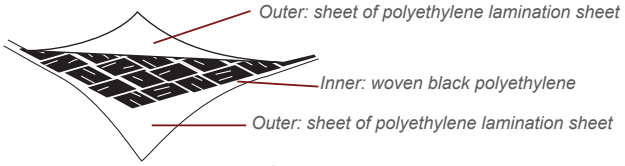
Initial specifications were for two types of tarpaulin: one with a black woven core and one braided, though with time the braided version was dropped. As issues arose, new tests were added. These included colour testing to ensure that the laminations are sufficiently thick.

These standards were adopted by many of the largest humanitarian agencies.[1] Further research was conducted on flame retardancy, which was going to be included in the next update of the specifications, scheduled for 2019.

QUALITY CONTROL

Quality control (QC) is implemented in multiple ways. Each line of the specification has corresponding tolerances and a grade to indicate whether shipments should be refused (a critical failure that compromises performance) or accepted (with or without penalties). Controls are made at factory door and in a network of agency managed QC centres in agency warehouses. The inspections are led by trained quality controllers and -- upon request -- with the help of external laboratories, in order to ensure compliance with the minimum requirements. If goods fail to match minimum requirements, financial penalties are imposed to suppliers and a corrective action plan is requested. A global network of 20 QC centres was established by four major agencies over the years using the same set-up. Agencies regularly meet and share findings.

[1] Updated specifications are available at https://bit.ly/2Wg2Z9f.



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

EXAMPLE OF STANDARD SPECIFICATIONS	
Material for the plain sheet	Woven high-density polyethylene (HDPE) black fibers fabric laminated on both sides with white low density polyethylene (LDPE) coating.
Tear strength in plain sheet at state of origin	Minimum 100N under ISO 4674-1B 2003, with a test piece of 200x200mm as described in ISO 4674 annex B, in plain sheet.
Width	4m ± 1% net width.
Length	6m minimum net length.
Weight, complete sheet including bands weight	Plain sheet specific weight plus 10% additional weight for the reinforcement bands under ISO 3801. Total weight from 187g/m² minimum and 231g/m² maximum. Specific weight of the bands from 150g/m² minimum and 200g/m² maximum.
Colour	White sun reflective on both sides of the sheet. Grey coating on the outside of the bands. Inner black fibers to ensure opacity.

FACTORY AUDITS

In recognition of variable working conditions and the potential for negative impacts both on the internal working environment and on external pollution by factories, agencies started conducting factory inspections. These, known as Quality, Social and Environmental (QSE) audits, were set up as part of the implementation of the lead organization's ethical purchasing policy. Audits are performed in partnership with external companies. Care is required to ensure that the factories visited represented the entire supply chain for each supplier. After each audit, the critically underperforming suppliers are blacklisted. All suppliers are presented with a list of recommendations, with the goal of promoting better performance.

INTER-AGENCY COORDINATION

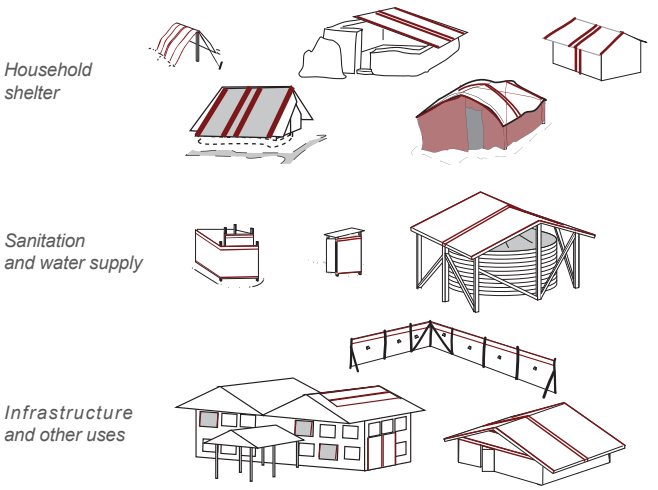
The QSE Procurement Group was created in November 2010 to promote inter-agency collaboration. Its aims at sharing information and best practices to develop synergies related to quality, social and environmental concerns regarding procurement of relief items. It acts in line with each organization's internal regulations and policies. In the long term, the group's purpose is to optimize quality management performance, as well as to define an ethical framework related to humanitarian procurement. One of the major products looked at by the QSE group is the tarpaulin.

MAIN CHALLENGES ENCOUNTERED

Throughout the years, with changes in the producing companies, the quality of the product had the tendency to decrease. The QC system described above enhanced the capacities of agencies to perform a continuous and reliable follow-up of all deliveries. This long-term action helped bring back the quality to the desired level.

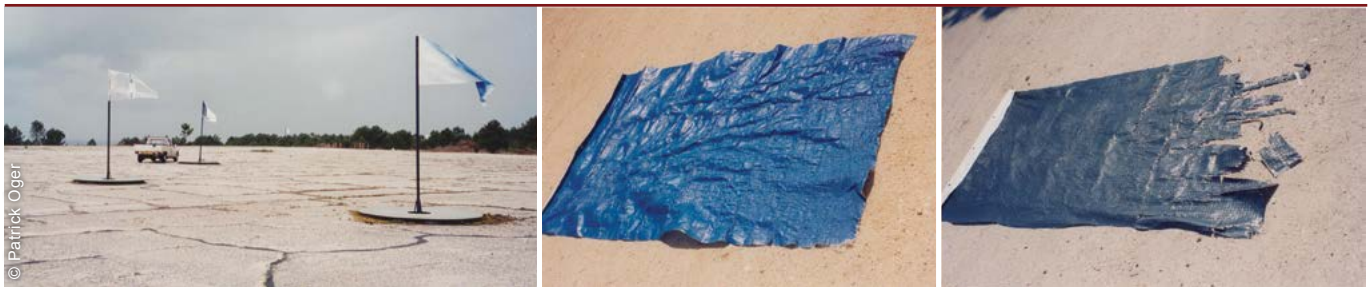
WIDER IMPACTS OF THE PROJECT

Whilst agencies recognize that plastic sheeting is far from ideal and is only one component in shelter solutions in emergencies, it remains the most practical and cost-effective material in terms of logistics and functionality. It can also be used for multiple purposes other than shelter, including for construction of medical and educational facilities. Plastic sheeting is one of the most life-saving of humanitarian products, reaching millions of people every year. For those in need of emergency shelter, there is a huge difference between a good-quality tarpaulin with a prospected lifespan of a year or longer, and a poor-quality one with a lifetime of just a few weeks or months.



Tarpaulins can be extremely versatile. Guidelines on their procurement, use and testing are available at http://www.plastic-sheeting.org/.

STRENGTHS, WEAKNESSES AND LESSONS LEARNED



Flapping tests showed how poor-quality plastic sheets degrade and tear extremely quickly, especially when exposed to strong sunlight, as in most field applications.

STRENGTHS

+ Collaboration and exchange of information from all major organizations to develop very similar specifications and quality control processes.

+ Universal applicability of the inter-agency standard specifications.

+ Common specifications and tenders across agencies allowed manufacturers to **produce larger quantities faster and at lower cost,** because of the decreased need to change production line set-up between orders.

+ Technical solutions improved items' quality and workers' conditions. For example, the use of reinforced bands with pre-punched holes in the tarpaulins, instead of eyelets, not only improves quality, tear resistance and is preferred by users, but also allows industrial processing, avoiding placing eyelets by hand in unacceptable working conditions.

+ The needs of crisis-affected populations can be met more effectively and consistently, with products that last ten times longer than poor-quality plastic sheets.

WEAKNESSES

- Lack of specific research and development funding and expert capacity within agencies, as well as low reactivity (variable in the different organizations), led to an extended time to implement.

- Low capacity to retain the history of products' development, in every organization.

- Challenges in maintaining a consistent quality control system for all shipments and for all details. Some details, such as ultraviolet resistance, are harder to test rapidly and without sending samples to laboratories.

- Shelter-grade standard tarpaulins are not a default product in many countries, meaning that they have to be imported at cost and often with delay.

- Not all agencies or operations use the standard tarpaulins. For example, some major agencies use 4x6m tarps, others use 4x5m.

- Many agencies insist on branding, making interchangeability of stock challenging.

Peeling and scratching tests can be conducted in the field after basic training.

Entire settlements for displaced populations use shelter-grade plastic sheeting. A high-quality and durable product means needs of affected people are better met.

LESSONS LEARNED

- **Dedicated capacity** is needed to continue improvements in the long term. This requires **advocacy with senior management** to support activities and ensure consistency of specifications is followed.
- **Inter-agency collaboration should be strengthened.** The Quality, Social and Environmental procurement project should receive top management endorsement, to push the products' evolution forward.
- **Quality assurance systems should be implemented,** including application of penalties. As most specifications can be verified with simple equipment, quality control centres should be installed and staff trained in as many locations as possible. This would reduce the amount of poor-quality plastic sheeting distributed in humanitarian responses.
- Need to maintain **diversity of suppliers** to ensure competition and availability of larger supply chain.
- Advocacy is required for more **support to research and development within the humanitarian sector** more broadly, and the shelter sector specifically.