International Federation of Red Cross and Red Crescent Societies
Shelter Research Unit
an initiative of the Benelux Red Cross Societies

"KIZILAY WINTER TENT"

PHASE II: WINTER TENT FINAL DESIGN

Supported by Turkish Red Crescent

TURKISHREDCRESCENT
TÜRKKIZILAYI
1868

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1. Introduction

The original 16m^2 Kizilay tent was developed by Kizilay (Turkish Red Crescent). Its tent factory produces reinforced tents and other shelter products, such as rub-halls of various sizes. The National Society has distributed 6,068 tarpaulins aiming to provide tents a better insulation during winter season. Also, the total number of tents distributed is 65.602 and total number of tarpaulins distributed in camps is 25.956. By early November 2013, with international support, the NS has distributed some 33,240 tents (including replacements for damaged ones that are not double counted): these tents have been designed to endure harsh winter and weather conditions in camps.

The IFRC-SRU on behalf of LRC-AI shall deliver technical consultancy services to TRC in order to jointly design a winter tent solution to be used in the Syrian crisis response, based on the winterisation solution already in use in TRC tents. Special attention was dedicated to improve thermal comfort, as thermal comfort is one of the principal factors for beneficiary satisfaction and also has effects on beneficiary health. Furthermore conduct technical testing of the tent, to establish technical performance criteria. This program aims to improve the thermal behavior of light shelters distributed therefore provide a better quality of life while significantly reducing fuel consumption per heating putting these tents.

This report presents the final choices and description for the composition of the 16m^2 winter tent from Kizilay . This proposed winter tent is a feasible and fast emergency shelter, adapted to moderate winter climates.

2. 16m^2 tent for winter conditions, final conception.

The aim of design is to provide a specific shelter solution for moderate winter conditions while maintaining the basic characteristics of 16.2m^2 shape, structure and general aspect which is widely appreciated by the Kizilay factory team.

The solution needs to be easy to implement even with only basic skills. The solutions should be based on the obtained information after the testing period and use as much as possible the actual capacities of the Kizilay factory in order to facilitate the construction process and keep the cost low.

2.1. Structure

The proposed dimension for the 16m2 tent for winter conditions is 4,05X4.00 with a total surface area of 16,2m^2.
The final solution takes up the structural system of the original tent with a reduction of the section of the structural elements and standardisation on the dimensions of the aluminium pipes with only two sizes. For these aluminium poles were used pipes on 40x2mm, whereas the roof structure are fixed by plastic connectors. The main idea behind using aluminium poles was to reduce the total weight, improve the resistance of the structure and reduce the building time.
The height of the central tent is set to 2,40m and the height of the perimeter to1,85m with this measure the inside tent space over 1,80m of height is more than 80% of the total surface. All of these structural modifications do not affect the shape of the actual tent and the general proportions of the original model remain similar. However the new dimensions allow for standardisation and simplification of the construction process through reduction of materials for structure as well as for cladding material.

Structure

Structure detail- Pipes to plastic joint

2.2. Outer tent

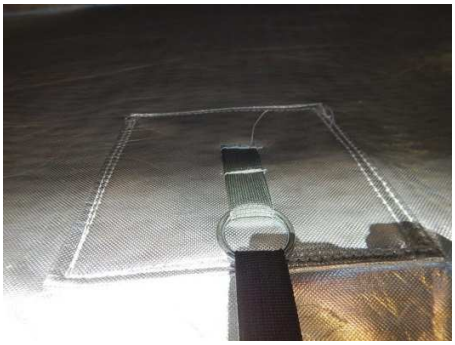
The outer tent is created as an enclosure system with non structural functions the outer tent is made with several types of fabrics in order to provide different characteristic to improve the comfort inside the tent. The outer tent is supported by the structure, covering 100% of the tent volume. The outer tent have to be maintained in position by an adjustable guy belt system to the feet of the structure in the interior part of the tent and in the exterior by 6 guy belts fixed with anchors to the ground. The roof and side flaps are 1,5 mm nonwoven fabric with 200g/m^2 coated PVC on the top. The bottom layer is a breathable, water proof, anti-fungus and anti-bacterial nonwoven fabric. The bottom flaps in PVC 200g/m2 and the rest of the outer tent is in 1,5 mm nonwoven fabrics with the following performances: 220g/m2, breathable, water proof, anti-fungus and anti-bacterial lamination over the nonwoven fabric. The entire outer tent has fire retardant treatment.

Outer tent general view

Outer tent with open flap

2.2.1. *Attachment system*

The outer tent has to be anchored to the ground using 6 guy belts attached to 6 metallic anchors.
Each guy belt length allows to be folded in two, for the creation of a 30mm loop. This should be stitched to the tent with a strong sewing (Z or W) over a reinforced area of 200x200mm. The guy belt has to be sewn perpendicular to the side edges of the tent and using 30^0 angle in the corners. The guy belts have to be attached by (d=50mm) metallic ring, and when the tension is applied, the belt slide through this system.
Each guy belt has a metallic strap tensioner 50mm in galvanized steel with automatic close system.



Guy belt and roof reinforced union

2.2.2. *Outer tent windows and doors*

The outer tent has 2 front and back doors and 2 side windows protected with mosquito net. The two side windows are protected by winter flaps all along of the tent side. The interior dimension of the windows is 300x750mm and the top edge of the windows is situated 1,80m over the ground level of the tent. The windows open have to be reinforced over the entire perimeter with a 30mm strip sewn all around. The side flaps are active part of the outer tent roof all along the tent side, from the end line of the roof to the upper part of the PVC flaps. The windows flaps have a strip of 30mm wide Velcro webbing along the length of its vertical side and its bottom, sewn 30mm from the edge of the window. Loops and belts have to be attached to keep the flap open or rolled up. The outer tent door is 1,80m high with reinforced door side and protected with a two way ZIP. The head of the Zip have to be reinforced by a 50x50mm fabric piece sewing by a strong stitch. The doors have a lock system in the bottom to allow closing with a hand lock.

Windows and doors open - Front view

Windows and doors closed - back view

2.2.3. *Chimney reinforcement.*

There is one piece in non-flammable textile-reinforced for the chimney stove hole D=300mm with iron sheet all around, placed on the right side of the back door (the centre will be at 1,60 m height over the floor level and 0,40m from the bottom corner).

Chimney reinforcement- tent back side

2.2.4. Other accessories

On the outside of each left-hand door, in the front wall, the outer tent has a transparent plastic pocket for documentation. This pocket has to be made in UV-stabilized polyurethane transparent plastic with a minimum thickness of 0.15mm with interior dimensions of 230x330mm. The pocket has to be open in one of the long side and close in the other 3.

Front view

2.3. Winter room (inner tent)

The winter room is square-shaped (3.90x3.95m), hanged inside from the structure and attached from the metallic support by the feet. All the dimensions are designed in order to ensure an air chamber between the winter room and the outer tent. The roof and walls are made in 1.6 mm nonwoven fabric with breathable, water proof, anti-fungus and anti-bacterial lamination. The ground sheet is a multi-layer material with a first layer, on the bottom, in PVC 200g/m2 and 2mm of nonwoven high density fabric 420g/m2 finished with a breathable lamination. One extra layer of nonwoven fabric with aluminium lamination has to be sewn in the corner of the buffer area to protect the wall and reflect the heat from the heater. The entire outer tent has fire retardant treatment.


Inner tent front view


Suspension system of Inner tent

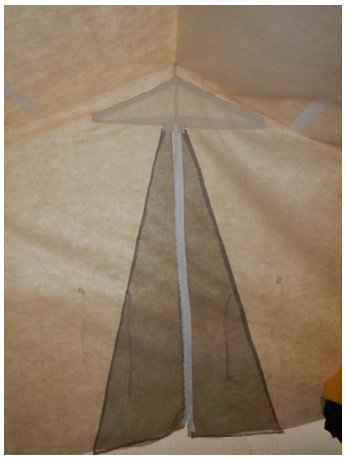
2.3.1. Suspension system

The winter room suspends from the metallic structure by 19 wide belts with 50mm galvanized straps. The total length of this flexible system has to be 800mm minimum. This flexible hanging system provides the possibility to use this winter room in other conditions as a collective centres or multi-proposal tents. The ground sheet is fixed to the structure as well by 6 belts with the same system and also fixed to the outer tent with another 4 belts with the same system. All the belts have to by stitched to the winter room with a strong sewing (Z or W) over a reinforced area of 50x50mm.

2.3.2. Winter room, windows and doors

The winter room has two windows with mosquito net of equal size aligned with the outer tent windows. The flaps of this windows are made on the same material than the winter room, must be sewn from the inside and open upwards. The flaps close using a 30mm-wide Velcro strip in 3 sides.

The winter room has 3 doors, two exterior and one interior. These doors are 1,80m high closing with a two way zip reinforced on the top with a

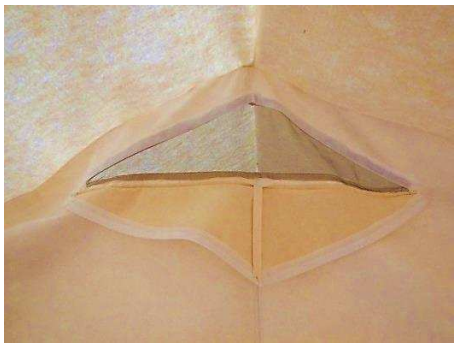

Inner tent door with mosquito net

50x50mm piece sewn on the winter room fabric and 1.20m of sewn Velcro in the bottom.
The 2 exterior doors have to be protected with mosquito net, closing with a two way zip and 30mm Velcro in the bottom.

Inner tent ceiling

2.3.3. Ceiling

The winter room has a removable ceiling layer made in 1.6mm nonwoven fabrics with aluminium lamination on the bottom and breathable layer on the top. This ceiling layer is fixed to the winter room by 4 Velcro lines, strongly sewing to the winter room roof parallel to the long side of the tent.



Open ventilation window with mosquito net

2.3.4. Ventilation

The winter room has 3 windows with mosquito net on each gable top (exterior walls and interior partition). This ventilation system must be close form the inside with flap that rolls downwards, and seal with 25mm wide Velcro on all the sides. These windows have to aligned with other two windows on the outer tent gavels protected with mosquito net and covered with a semi rigid flap in nonwoven material

Chimney reinforcement - inner tent

2.3.5. Chimney reinforcement.

The winter room have 2 pieces in non-flammable textile-reinforced for the chimney stove hole on equal size, the one on the back wall have to be aligned with the one on the outer tent and the one in the interior partition of the inner tent have to be 10cm lower than the other.

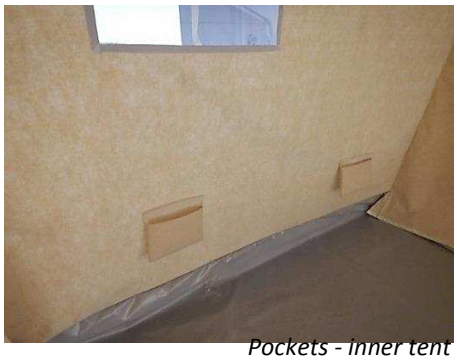
Partition of the inner tent

2.3.6. Partitions

The winter room has a partition made in 1,5 mm laminated nonwoven fabrics to create two different spaces: a buffer area or entrance and a private area.

2.3.7. Other accessories.

The winter room have 3 belts to hanging lightweight items and 6 pockets of 0.3x0.35m (four in the side halls of the private area and 2 on the buffer zone) attached on the top.
Two semi-rigid carpet (1x2m) made in insulation nonwoven fabric from the packaging. These carpets are designed to provide and extra insulation and protection on the floor. Two other complementary rigid pieces in fibre-cement (0.8x0.4m each) are designed to provide a non-flammable support for the stove that will placed on the buffer area.
Two PVC bags are also included in the packaging system with a secondary use in the original design as a ballast anchors over the exterior PVC flaps on the size of the tent.


Pockets - inner tent

2.4. Packaging

2.4.1. Standard packaging

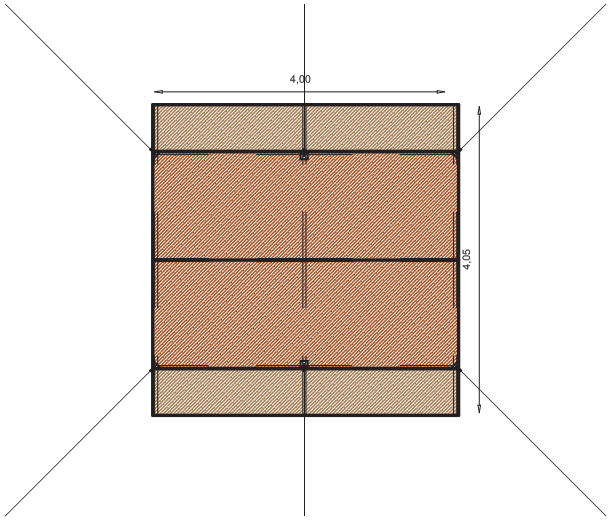
The entire winter tent including all the components have to be packed in one box. The inner tent and outer tent are folded separately and organized together in the box with the ground sheet outside. The structure pipe, plastic knots and anchors will be packed in two different PVC bags.
The box is made in nonwoven semi-rigid material for the long faces and two non-flammable rigid pieces in fibre-cement (0.4x0.6m) for the short ones. The box dimensions are 2x0.4x0.6m (0.48m^3); 4 boxes per euro pallet (56 boxes in a 20 feet container). The main box has to be secured with 2 polyester belt straps in 10mm wide with 4 handle loops.

2.4.2. Optional packaging

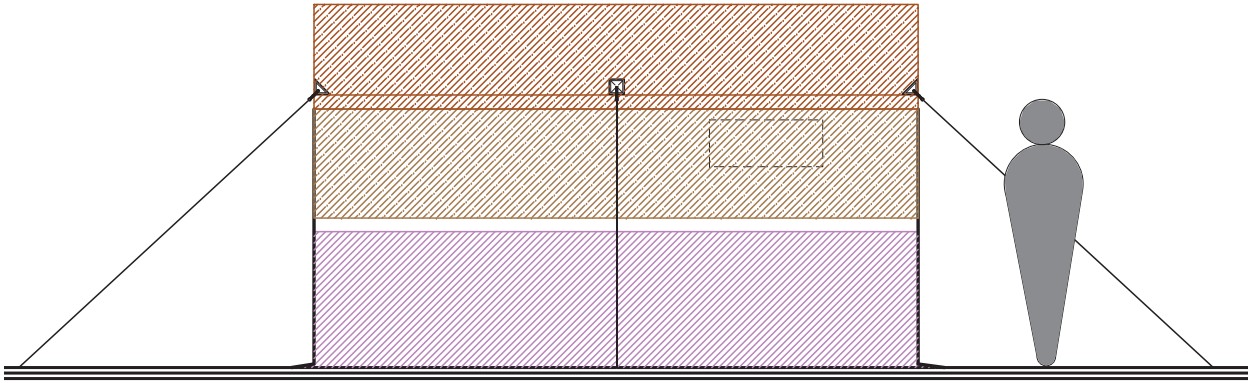
The optional package could be a PVC bag 2x0.5x0.6m with 4 handle loops and Zip. The entire winter tent has to be packed inside the bag in the same way than in the box. The carpets and stove supports have to be distributed in a separate package.

3. Graphic documentation.

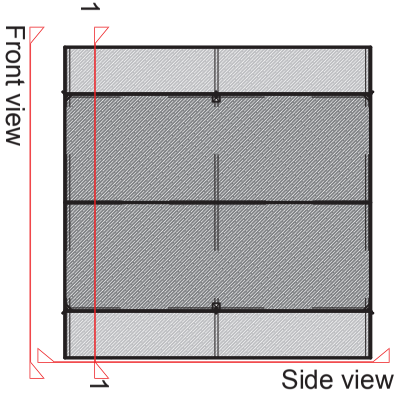
The aim of the next chapter is to summarize the necessary graphic documentation to build the Kizilay winter solution tent.
This documentation is organized as following:
01 General graphic information – Scale 1:50 and 1:100
02 Dimension plans – Scale 1:5; 1:50 and 1:100
03 Winter room details – Scale 1:5; 1:50 and 1:100
04 Winter room details – Scale 1:5 and 1:50
05 Structure – Scale 1:5 and 1:50
06 Packaging – Scale 1:50



Plan View - E. 1/100



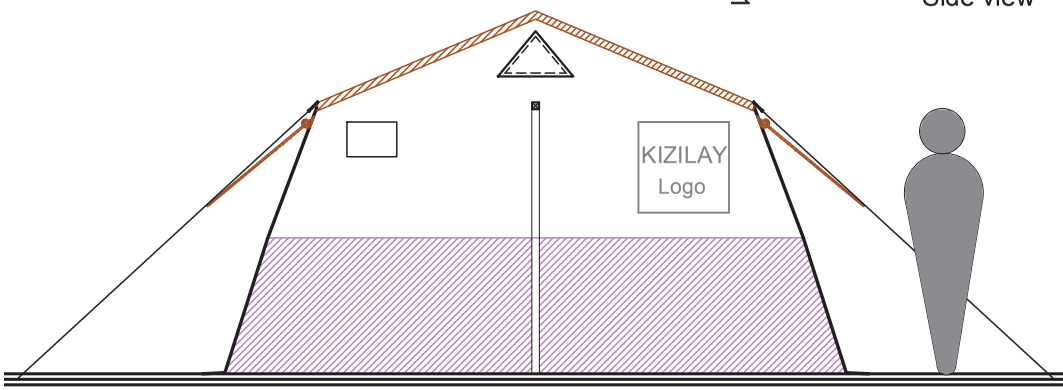
Side View - E. 1/50



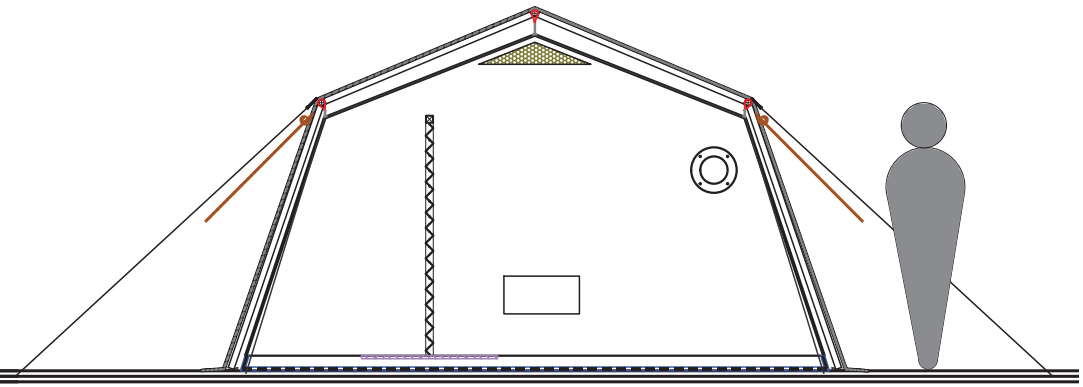
Side view

Winter solution for Kizilay tent.

16m² Rectangular based double fly tent.
Self standing structure, frame made of 6 poles, 6 roof pipes and 6 horizontal bars with plastic connectors. Inner tent 1.5mm laminated nonwoven fabric in one piece including walls, doors, windows and 3.5mm lamineted nonwoven fabric with the exterior layer in PVC for the groundsheet. Outer Tent includes PVC flaps, roof and windows flaps in nonwoven fabric and coated PVC.



Front View - E. 1/50



Section 1 - E. 1/50

PAGE	TITLE		
1	Kizilay tent, winter solution with 16m2 Plan view Side and front view Section		
	IFRC-SRU Research Officer Daniel Ledesma	DATE October 2014	SCALE 1/50 and 1/100

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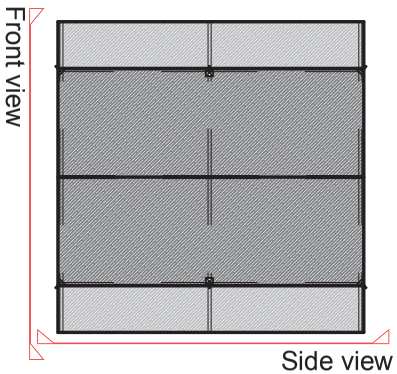
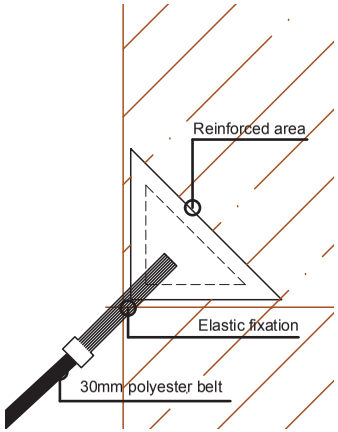
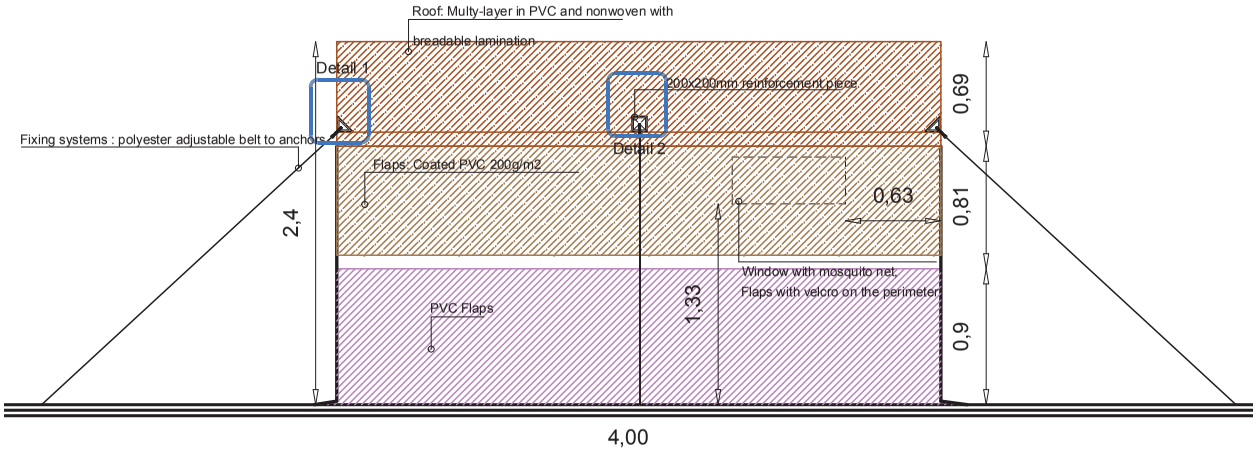


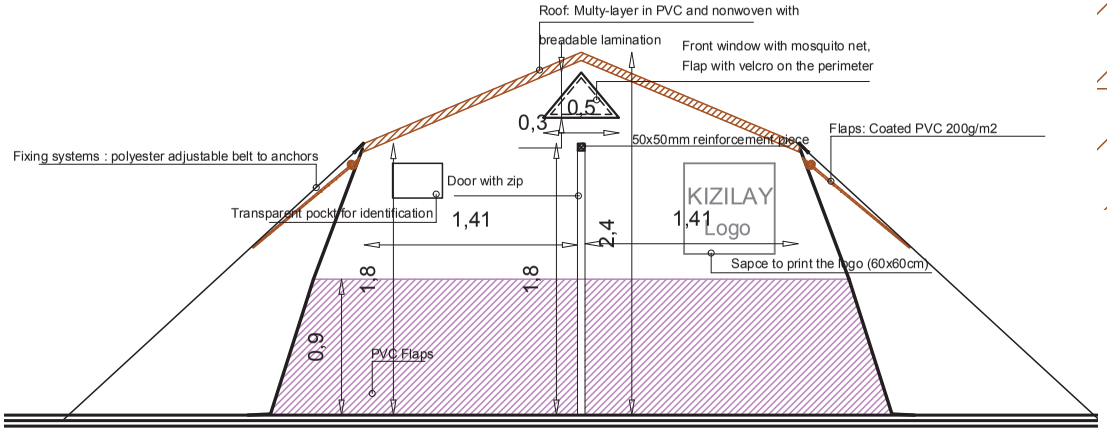
Reference plan



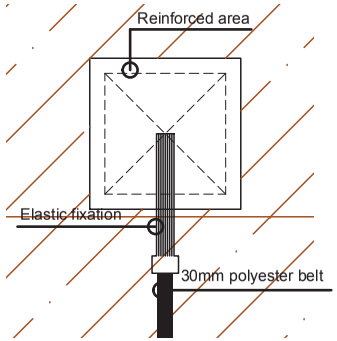
Detail 1 - E.1/5



Side View - E. 1/50



Front View - E. 1/50



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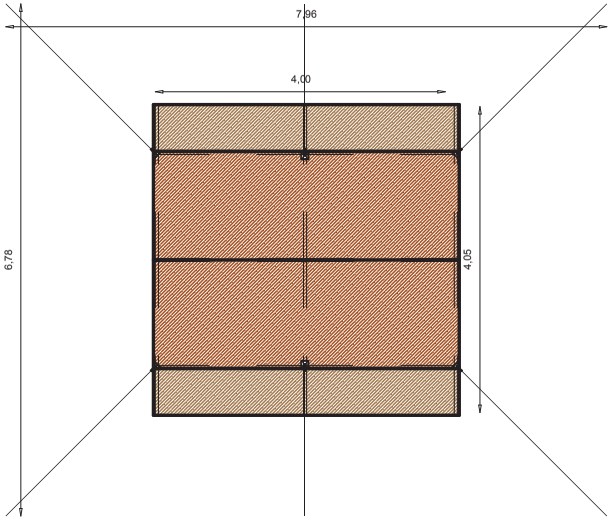

Plan View - E. 1/100

PAGE 2	TITLE Kizilay tent, winter solution with 16m2 Dimension plan view Dimension, side and front view Details		
	IFRC-SRU Research Officer Daniel Ledesma	DATE October 2014	SCALE 1/5, 1/50 and 1/100

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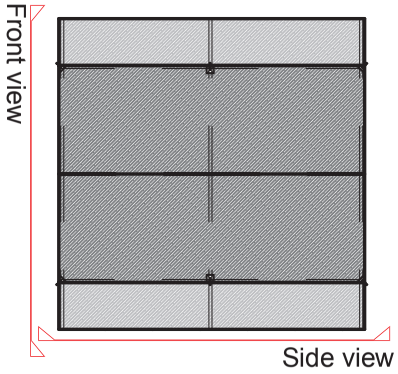
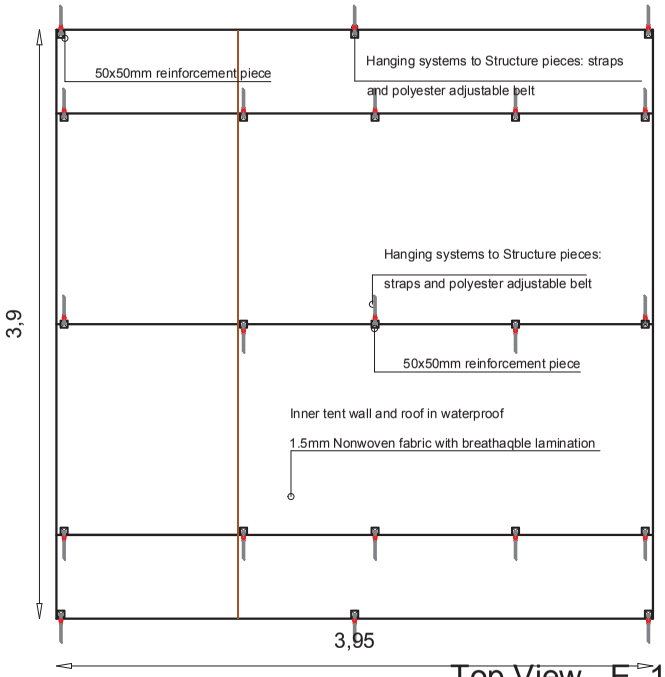
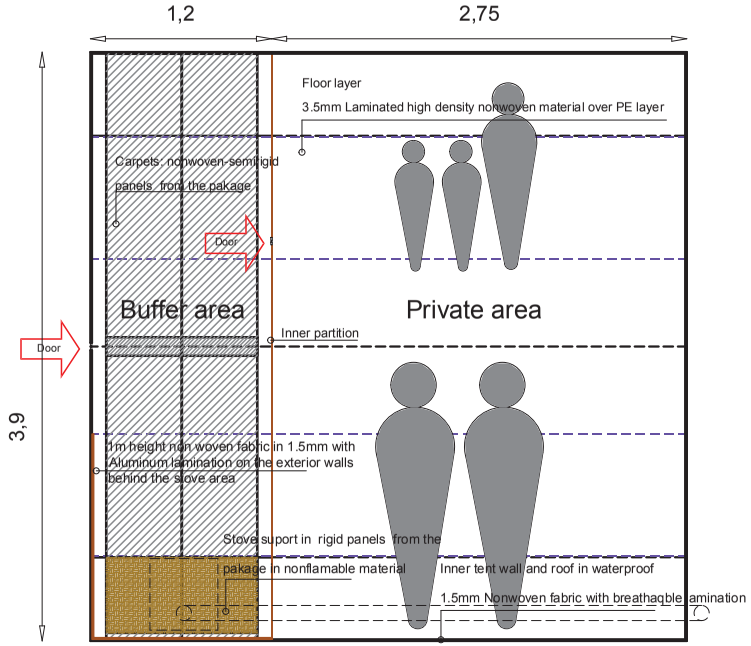


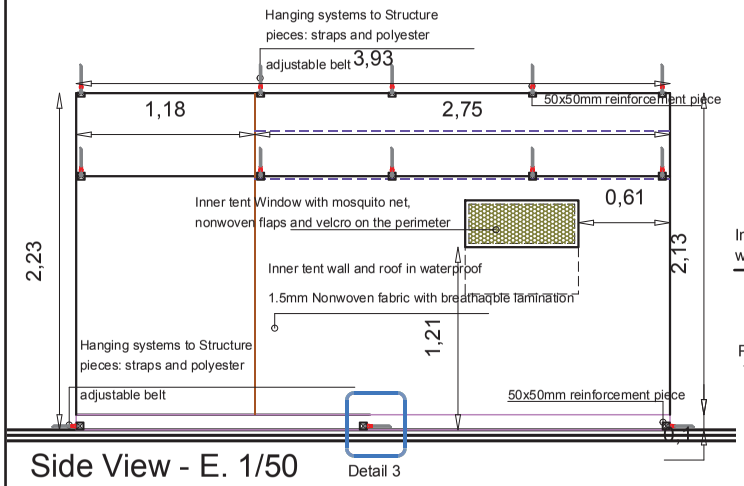
Reference plan



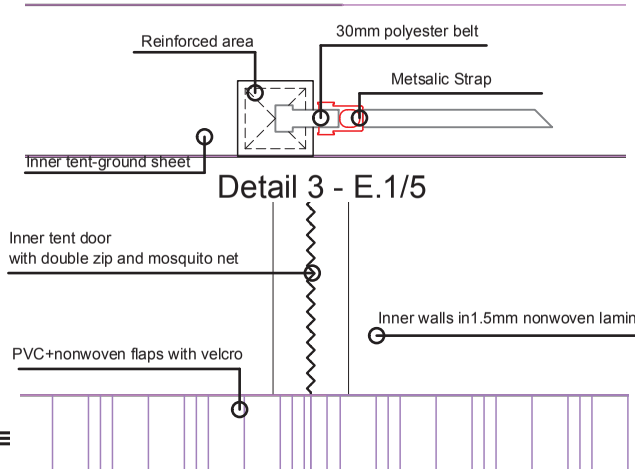
Top View - E. 1/50



Plan View - E. 1/50

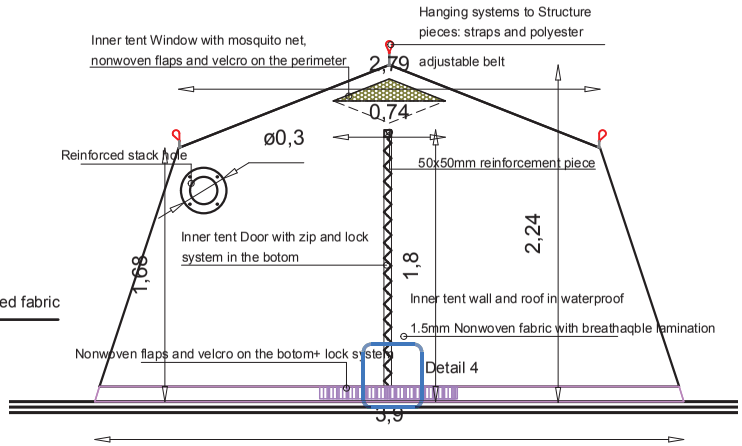


Side View - E. 1/50



Detail 3 - E.1/5

Detail 4 - E.1/5



Front View - E. 1/50

PAGE	TITLE	
3	Kizilay tent, winter solution with 16m2 Winter room dimension top and plan view Winter room dimension, side and front view Details	
	IFRC-SRU Research Officer Daniel Ledesma	DATE October 2014
		SCALE 1/5, 1/50 and 1/100

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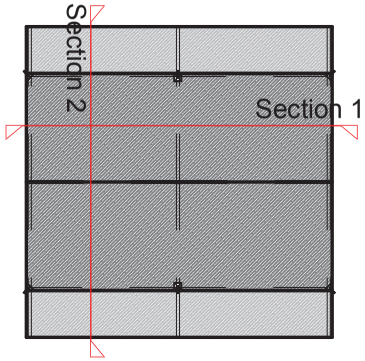
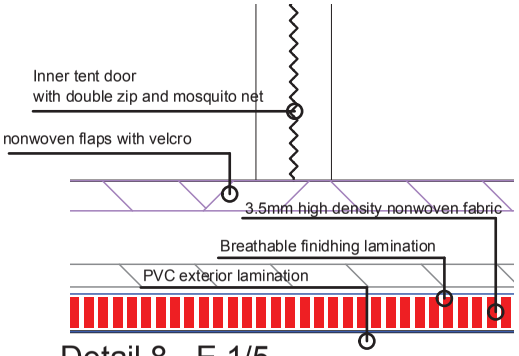
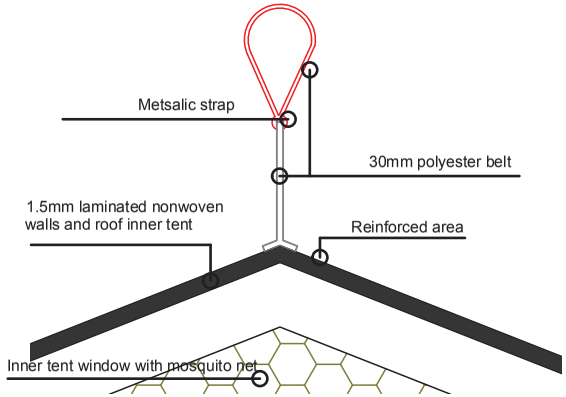


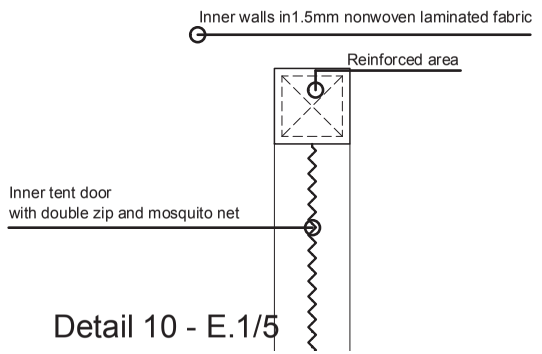
Reference plan



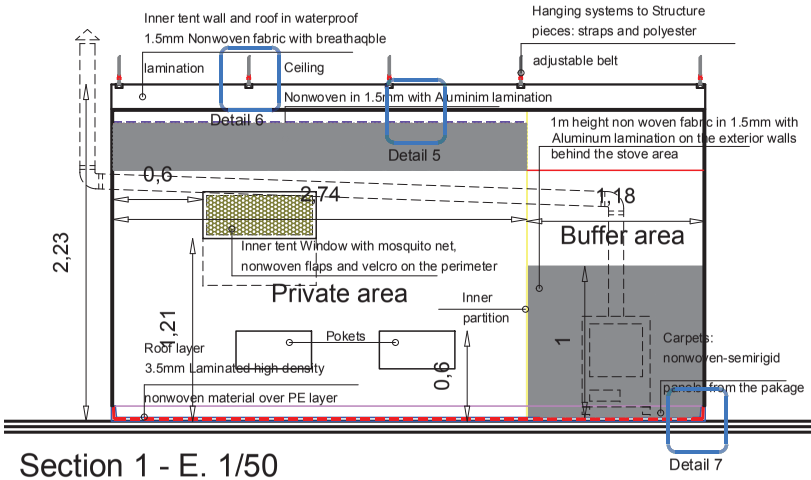
Detail 8 - E.1/5



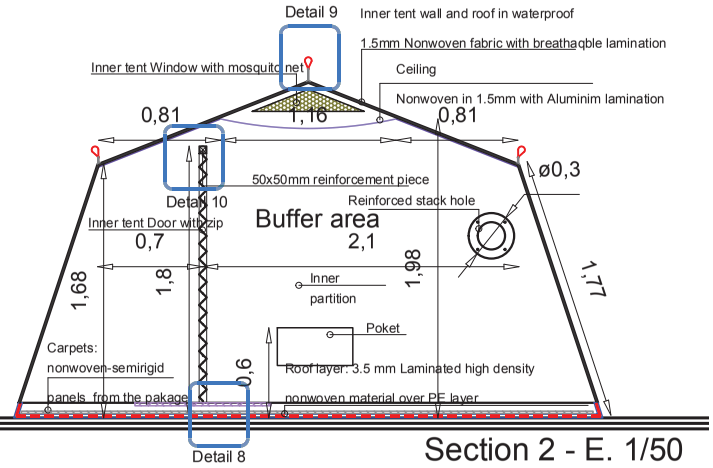
Detail 9 - E.1/5



Detail 10 - E.1/5



Section 1 - E. 1/50



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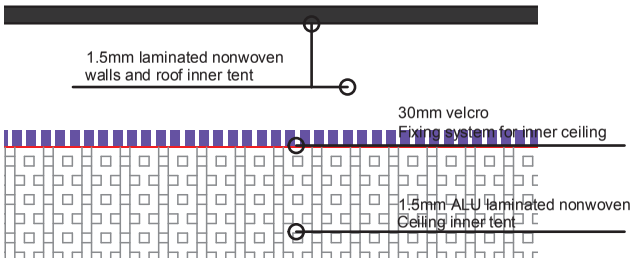

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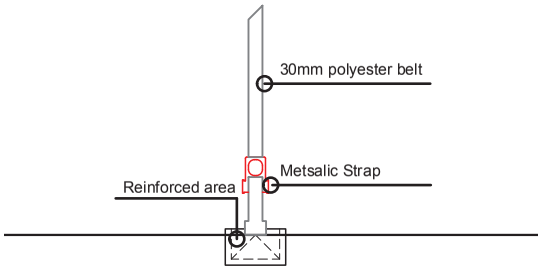
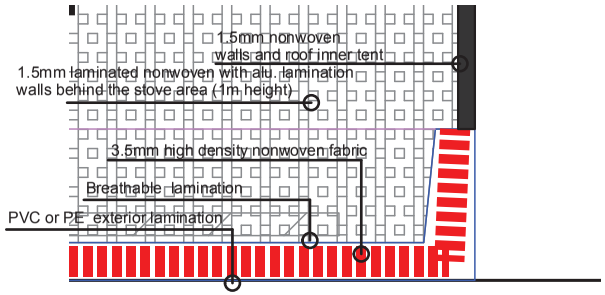


Detail 6 - E.1/5



Detail 7 - E.1/5

PAGE	TITLE	
4	Kizilay tent, winter solution with 16m2 Winter room sections and dimensions Details	
IFRC-SRU Research Officer Daniel Ledesma	DATE October 2014	SCALE 1/5 and 1/50

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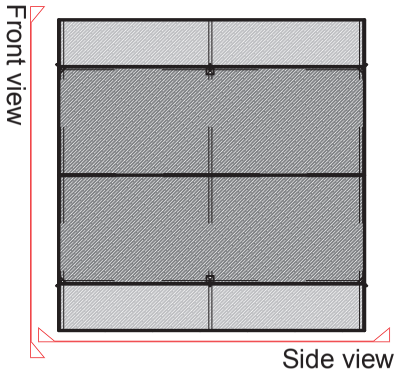
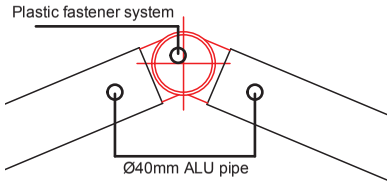
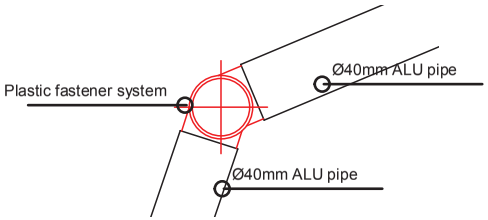


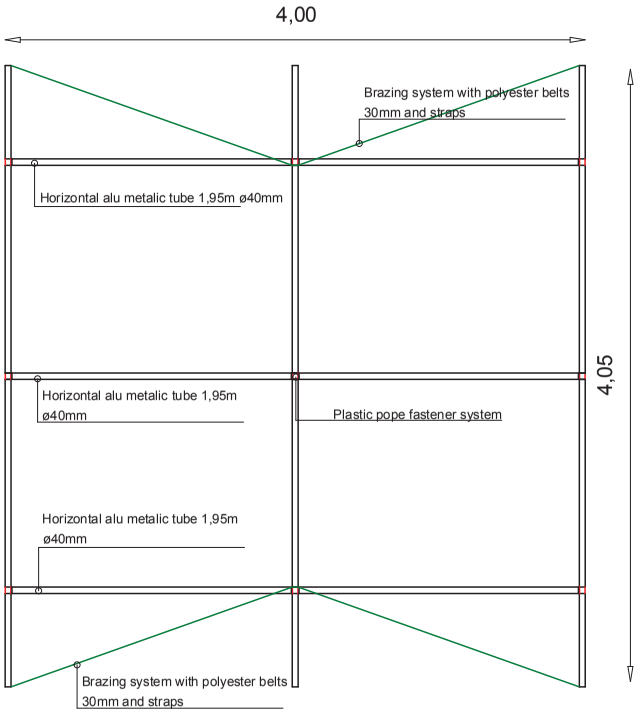
Reference plan



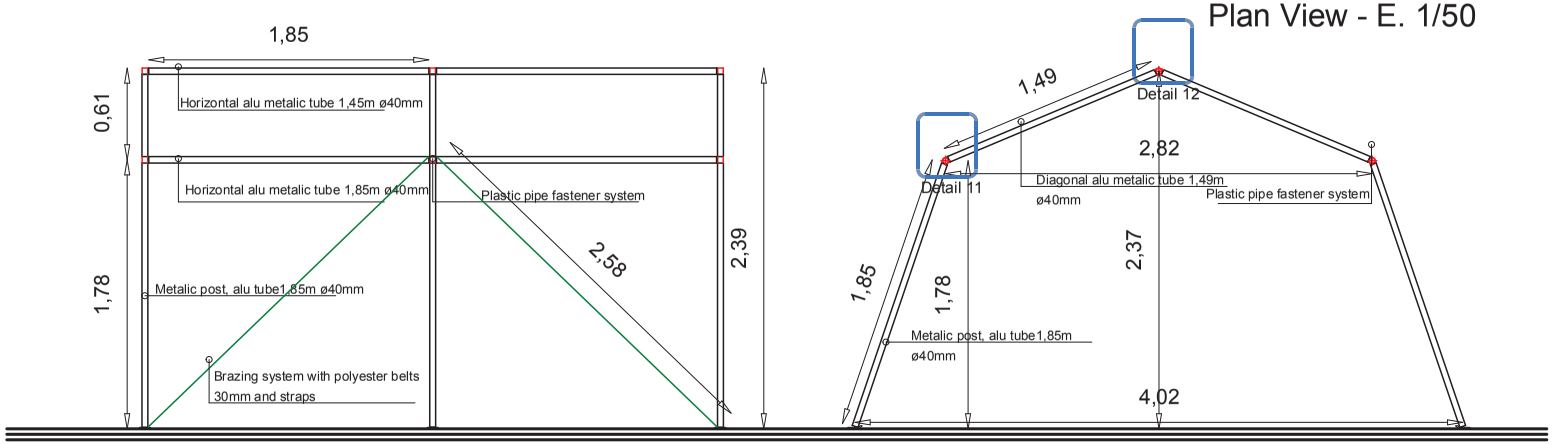
Detail 11 - E.1/5



Detail 12 - E.1/5

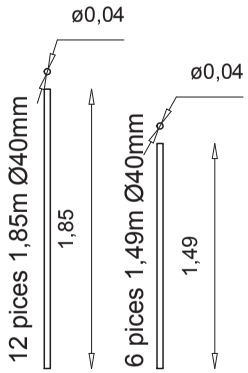


Plan View - E. 1/50



Side View - E. 1/50

Front View - E. 1/50



PAGE	TITLE	
5	Kizilay tent, winter solution with 16m2 Structure Plan view Structure side and fron views Detail	
	IFRC-SRU Research Officer Daniel Ledesma	DATE October 2014
		SCALE 1/5 and 1/50

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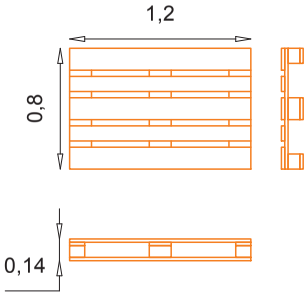
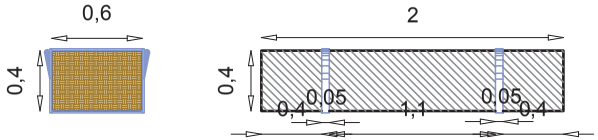
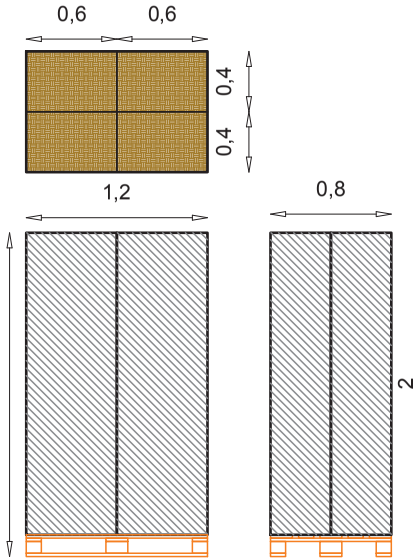


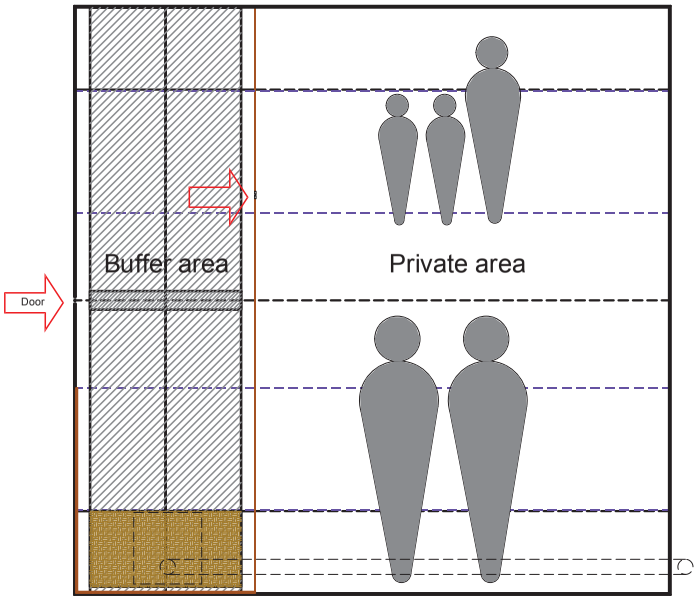
Euro pallet dimensions E.1/50



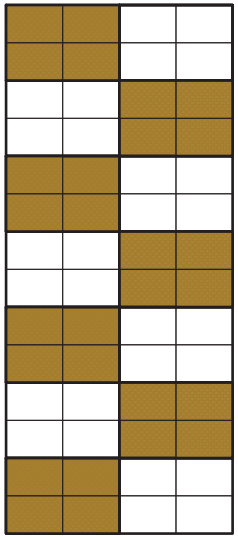
Packaging dimension for Kizilay tent E.1/50



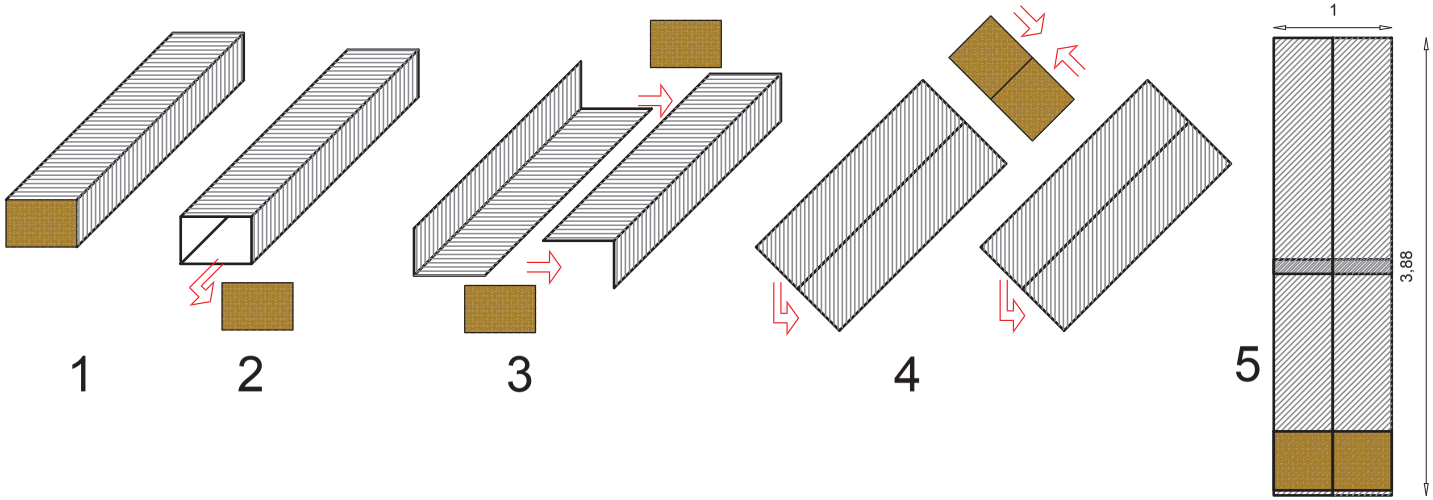
Palletization of Kizilay tent
4 tent/europallet - E.1/50



Inner tent plan view with "packaging reutilization" - E1/50



56 units/ 20 feet container



Unpackaging steps and reutilization

PAGE	TITLE		
6	Kizilay tent, winter solution with 16m2 Packaging proposition Unpackaging steps and reutilization		
	IFRC-SRU Research Officer Daniel Ledesma	DATE October 2014	SCALE 1/50

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