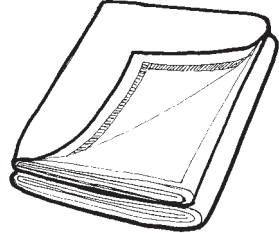


D.1 IFRC shelter kit contents: summary poster

TARPAULIN – Quantity per kit: 2 (SHETARPW406)

TARPAULIN – 4m x 6m

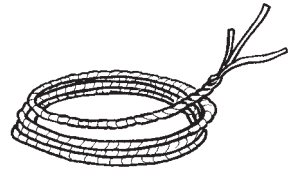
Tarpaulins are made of woven plastic. They are the key component of the shelter kit. They can be used for roofing, walls and floor covering.



SHELTER TOOL KIT – Quantity per kit: 1 (KRELSHEK01) Contains:

ROPE – Quantity per kit: 1

A universal fixing with many uses, such as binding timbers together, stabilising structures or fixing tarpaulin in place.



HANDSAW – Quantity per kit: 1

The handsaw is for cutting timber to required size. Do not use on metal or other hard materials.



NAIL for roof sheets – Quantity per kit: ½Kg (approximately 1lb.)

Nails for roofing sheets are have a domed head and a washer. They are used for fixing tarpaulins to timber, and for fixing corrugated iron sheet. When used properly the nails will not let rain seep through their own holes.



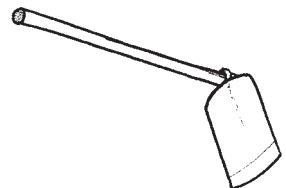
SHOVEL – Quantity per kit: 1

The shovel is useful when preparing the foundation of a shelter. It can also be used for digging trenches around the shelter if it is raining. It can be used as an everyday tool when disaster affected people re-establish their livelihoods.



HOE – Quantity per kit: 1

The hoe can be used to prepare the ground for a shelter. It can be used as an everyday tool when disaster affected people re-establish their livelihoods.

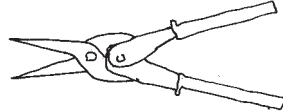


MACHETE – Quantity per kit: 1

The machete is shaped like a very big knife. It is also useful for clearing sites, shaping timber or, bamboo, and cutting extra materials.

**SHEARS – Quantity per kit: 1**

The shears are for cutting metal roofing sheets, and wire. Cutting wire or nails with the shears will damage them.

**NAILS, LARGE – Quantity per kit:**

½kg (approximately 1lb.)

These are 75mm long, simple nails for building with timber.

**NAILS, SMALL – Quantity per kit:**

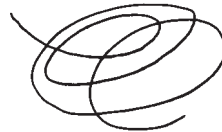
½kg (approximately 1lb.)

These are 40mm long, simple nails for building with timber.

**TIE WIRE – Quantity per kit: 25m**

(approximately 82ft.)

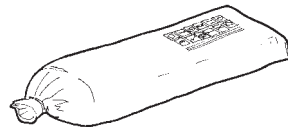
1.5mm diameter tie wire can be used for binding timber or bamboo, or for fixing tarpaulins. It can also be used for reinforcing structures and for diagonal bracing.

**CLAW HAMMER – Quantity 1**

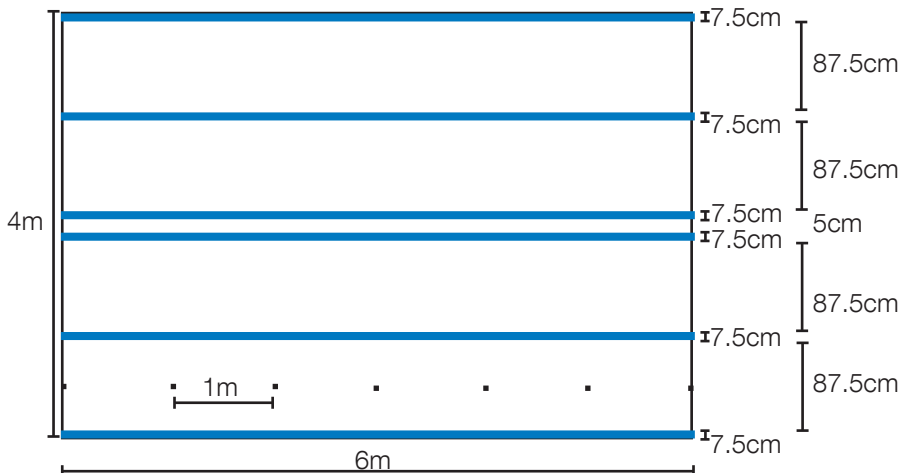
For driving and removing nails, and for working with other tools to make joints.

**WOVEN SACK – Quantity 1**

Woven sack is for easy packaging and transportation of the shelter kit.



D.2 Tarpaulin - (HSHETARPW406)



Quantity per kit 2

Standard plastic sheeting was developed in an inter-organisation research project. It is recommended not to use other types of plastic sheets found on local markets.

Material	Woven high-density polyethylene (HDPE) black fibres fabric laminated on both sides with low density polyethylene (LDPE) coating.
Reinforcement	Reinforced with 6 bands of 7.5cm width made of woven black HDPE fibres fabric and coated outside. Positioned as in the drawing above.
Tensile strength	Minimum 50DaN and 15% to 25% elongation in warp and weft outside of the reinforcement bands under ISO 1421.
Tensile strength of the reinforcement bands	Minimum 70DaN inside the reinforcement bands as per ISO 1421 plus the additional procedure.
Tear strength	Minimum 10DaN under ISO 4674 (A2) outside of the reinforcement bands.
Welding	Only one welding allowed, in the middle of the sheet, lengthwise. Minimum resistance is 80% of the original tarpaulin tensile strength in weft under ISO 1421 plus additional procedure

Ultra violet (UV) resistance	Maximum 5% loss on original tarpaulin tensile strength under ISO 1421 after 1500 hours UV under ASTM G53/94 (UVA 313 nm peak), to be tested outside and inside the reinforcement bands.
Width	4m standard size $\pm 1\%$ net width
Length	6m
Weight ISO 3801	200g/m ² $\pm 5\%$, plus 10% for the reinforcement bands under ISO 3801.
Temperature resistance	Temperature resistant from -20°C to 80°C .
Features	Water, rot, soil and fauna resistant. Long outdoor use life in all climates.
Flammability	Flash point above 200°C .
Colour	White sun reflective on both sides, grey bands. Inner black fibres must ensure good opacity.
Printing	On each piece, manufacturer name, month and year of production (letters of 2.5cm [1 inch] high maximum). One length indicator mark every metre/customer logo on request.

Further information:

- The expected life span of 2 years in severe tropical conditions.
- Irregular or pointed surfaces can puncture or wear through the plastic sheet. Be careful of sharp sticks or edges where the plastic sheet comes into contact with the frame of the shelter.
- Ensure that plastic sheeting is securely tied down to avoid it from flapping or getting damaged in the wind.
- To improve re-useability of plastic sheeting, avoid cutting plastic sheeting unless necessary.

Safety:

- Plastic sheet is flammable above 200°C . As a result, it must be kept away from heat sources, such as fires, cookers or stoves.
- Plastic sheeting does not protect against dangers such as falling rocks or trees. Ensure that buildings are on a safe site.

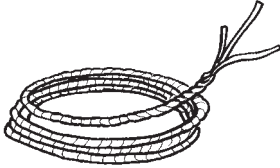


For further information on the use and specification of plastic sheeting, see

 [Plastic Sheeting, IFRC and Oxfam.](#)

D.3 Shelter Tool kit (KRELSHEK01)

D.3.1 Rope, 30m



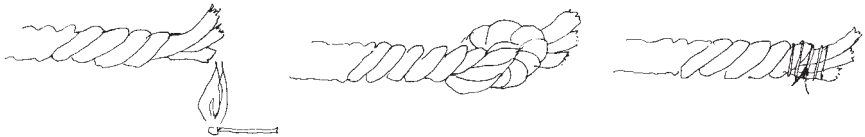
Black polypropylene rope, 12mm diameter, twisted.

Diameter	12mm \pm 0.5mm
Length	30m
Weight	1.9kg
Number of strands	3 minimum
Type	Twisted
Material	Polypropylene, no recycled fibres, UV stabilized
Colour	Black
Tensile strength	300kg

Maintenance

After cutting the rope it will become frayed. To avoid this:

- Burn the ends immediately after cutting the rope, in such a way that all the threads of the rope melt and fuse together.
- Tie a simple knot at the end of the rope.
- Tie the ends with adhesive tape or a wire.



Finishing a cut rope to prevent it from fraying. Left to right: burning the ends, tying a knot, binding the end with tape or wire.

D.3.2 Handsaw



Saw for timber, 400mm blade.

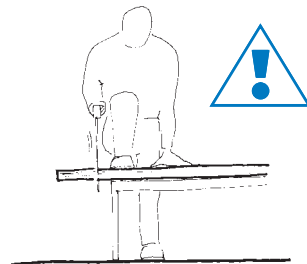
Type and dimensions	Carpenter handsaw, 400-450mm blade, lacquered, overall length 550mm \pm 50mm
Blade thickness	1mm \pm 0.05mm, protected against oxidation
Blade protection	Protective cardboard, teeth protection with hard, plastic cover.
Seal type	Laminated carbon steel, hardened and tempered
Number of teeth	7-teeth per inch
Quality of make	Soft edges but no dents, cracks or broken teeth
Hardness Rockwell C*	45 to 50 HRC for the whole blade, 48 to 52 HRC at teeth level
Carbon content	0.47% to 0.55%
Manganese content	0.5% to 0.8%
Handle	Wooden dismountable handle, minimum 3 fixations, polished varnish hardwood, large 85x35mm opening for hand comfort when wearing gloves. Optional 45/90° square.
Strength testing	With the blade inserted into a 10mm wide slot to a depth equal to 1/3 the blade's length, but not exceeding 150mm, a deflection of 90° is applied 25 times in each direction without breakage or permanent set to the blade.

Maintenance

- Saw blades should be kept covered, clean dry and sharpened.

Safety

- Hold the piece to be cut firmly on a solid and flat surface before starting to cut.
- Do not saw with too much pressure on the saw; the blade can bend or break.
- Saw blades should be covered with a cardboard or a plastic sheath when transporting them.
- KEEP OUT OF REACH OF CHILDREN.



*Hold the timber firmly on a flat surface before starting to cut.
Cut beside your body*

* "Rockwell Hardness C" is a hardness measurement that can be found in laboratories. It is based on the net increase in depth of impression as a load is applied

D.3.3 Nail, for roof sheets



Galvanized with watertight rubber washer, 75mm long (3.5"), umbrella type

Type	Iron nails, made of polished low-carbon steel, cold processed, not heat treated except for galvanization.
Shape	Spiral rolled or twisted shank, sealed umbrella-type spring-head.
Corrosion treatment	Hot-dip galvanized at 300g/m ² ±10%
Tensile strength	Minimum 650N/mm ²
Accessories	Attached rubber washer to each nail
Dimensions (+/-5%)	Shank: 75x3.6mm; head diameter: 22mm
Rubber washer	Diameter 26mm x thickness 2mm
Packing	Packed in a strong, thick plastic bag
Quantity	Net weight: 0.5kg

Using nails

- Nails being used for roofing should always have a rubber washer. If not, the roof will leak.
- Nails can often be re-used several times if they are straightened carefully.

Safety

- Old or broken nails should not be left on the ground as they could cause injury or puncture wheels.
- Pieces of timber should not be left on the ground with nails sticking out. Nails should be removed or hammered flat.



D.3.4 Shovel



Round point with Y handle

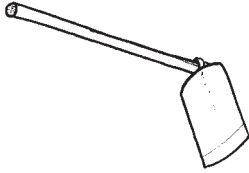
Material	Pressed carbon-steel, hardened and tempered
Corrosion protection	Black paint
Quality of make	No excess metal in the eye, no dents, no cracks, soft edges

Hardness Rockwell C	35 minimum to 48 maximum HRC
Carbon content	0.4% to 0.5%
Manganese content	0.5% to 0.8%
Silicone content	0.25% maximum
Phosphorus and Sulphur content	0.06% maximum
Dimensions	295x225mm
Hole diameter	Front side 36mm, back side 40mm
Weight	1kg \pm 50g, without handle
Strength testing	<ul style="list-style-type: none"> • Using a fitted, standard hardwood handle, clamp the blade of the shovel near the handle in a horizontal position. Gradually apply a load of 45kg and maintain it for 2 minutes. This should not result in any damage to the blade or a loosening of the handle, and no permanent set in excess of 25mm. • With one centimetre of the end of the blade secured in a clamp, move the handle back and forth 30 degrees. There should be no permanent set greater than 25mm. • With the shovel held in a digging position, a piece of wood, 37mm in diameter, is hit hard against it. The blade should not buckle or break.
Handle	<ul style="list-style-type: none"> • No chips, rough surfaces, holes or knots. Smooth, polished, varnished, surface. Dry, strong and flexible wood. Handle adapted to head so that it protrudes and can be blocked with a nail from the other side of the hammer-head eye. Total length 1,070mm \pm50mm. • The other end of the handle is made in a Y-shape with same quality of wood. The branches of the Y handle must be made in one piece only, of good-quality iron, securely fitted to the handle.

Safety

- Do not leave the shovel on the ground, as a trip hazard.
- When using the shovel, lift carefully so as not to hurt your back. Stand with your feet approximately hip width apart for balance, and keep the shovel close to your body. Bend from the knees (not the back) and tighten your stomach muscles as you lift the shovel. Avoid twisting movements.



D.3.5 Hoe

Material	Hot forged carbon steel, hardened and tempered. At a maximum the hardened zone should reach halfway up the back of the blade
Corrosion protection	Black paint
Quality of make	No excess metal in the eye, no dent on the cutting edge, reinforced head with a rib from the eye to the middle of the blade length.
Hardness Rockwell C	35 minimum to 48 maximum HRC in hardened zone of the blade.
Carbon content	0.4% to 0.5%
Manganese content	0.5% to 0.8%
Silicone	0.25% maximum
Phosphorus and Sulphur	0.06% maximum
Dimensions	180 x 240mm
Hole diameter	High raised neck, front side 43 mm, back side 48 mm \pm 2mm.
Weight	1.25kg \pm 150g, without handle, depending on the type of hoe
Strength testing	<ul style="list-style-type: none"> • Using a fitted, standard hardwood handle, clamp the blade of the shovel near the handle in a horizontal position. Gradually apply a load of 45kg and maintain it for 2 minutes. This should not result in any damage to the blade or a loosening of the handle, and no permanent set in excess of 25mm. • With one centimetre of the end of the blade secured in a clamp, move the handle back and forth 30 degrees. There should be no permanent set greater than 25mm. • With the shovel held in a digging position, a piece of wood, 37mm in diameter, is hit hard against it. The blade should not buckle or break.
Handle	No chips, rough surfaces, holes or knots. Smooth, polished varnished surface. Dry, strong, and flexible wood. Handle adapted to head so that it protrudes from and blocks the other side of the head. Total length 1100mm to 1200mm.

Assembly

- Insert the wooden handle into the blade.
- Hit the handle on the end that the steel blade fits in.
- If necessary, use wedges (as with the hammer) to hold the blade in.
- Submerge the head in water for 20 minutes so that the wood can swell and the handle fit the steel blade more securely.

Safety

- Regularly check that the blade is soundly attached to the handle.
- With a straight back, hoe towards yourself with open legs, so that there is no risk of the blade hitting your legs.

**D.3.6 Machete**

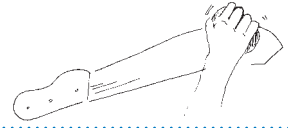
Type	Curved blade, 405mm/16", lacquered against oxidation, overall length 55cm.
Blade thickness	2.5mm thick with 3 grooves that runs the full length of the blade to key in the handle.
Handle	Wooden handle with 3 steel rivets plus washers.
Material	Hot forged carbon steel, hardened and tempered, hardened throughout the entire blade, but remains normal past the first rivet hole.
Protection	Blade packed in carton pocket for protection.
Quality of make	No dent on the cutting edge.
Hardness Rockwell C	45 minimum to 50 maximum HRC near cutting edge, test 3 positions along the cutting edge.
Carbon content	0.6% to 0.65%
Manganese content	0.6% to 0.8%
Silicone	0.30% maximum
Phosphorus and Sulphur	0.03% maximum
Handle	No chips, rough surfaces, holes or knots. Smooth, polished and varnished surface. Dry, strong, hardwood.
Strength testing	Insert the blade in a 10mm wide slot up to a depth equal to 1/3 its blade length, but not exceeding 150mm; apply a deflection of 45° in each direction without breakage or permanent set to the blade.

Maintenance

- These machetes need to be sharpened before use.

// D - Specification

- To sharpen the machete, a rounded stone can be used. Keep the stone wet and hold the blade at a slight angle to the stone. Rub the stone against the surface of the blade with circular movements.
- Ideally the edge of the blade should be sharpened daily.
- Do not stick the machete into the ground as this will damage the edge of the blade.



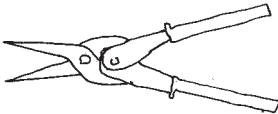
Sharpen the blade using a small stone and circular movements

Safety

- Wear strong shoes.
- Ensure that feet, hands, and the rest of the body are away from the materials to be cut.
- Check that there is no-one near, particularly behind you when using the machete.
- Keep machetes in a protective sheath when not in use.
- Take care when jumping or climbing over obstacles when carrying the machete. The safest way to pass obstacles is to throw the machete far ahead you before jumping.
- KEEP AWAY FROM CHILDREN!



D.3.7 Shears



Straight, for metal sheet, semi-hard 0.8mm maximum, 260mm long

Type	Tin snips for intensive use and easy maintenance
Make	Each blade and handle forged as one piece, symmetrical blades
Capacity	Up to 0.8mm semi-hard iron sheet
Material	Hot-forged carbon steel, hardened and tempered; special treatment applied to the blade edge
Rustproof	Protected against corrosion with special paint
Dimensions	Total length: 260mm \pm 2mm
Maintenance	Dismountable in two parts only, with bolt and self-locking nut

Maintenance

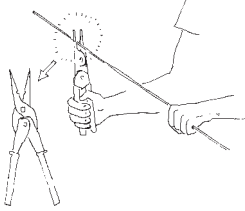
- These shears only cut thin metal plate. Wires, rods and steel nails may seriously damage the shears.
- Grease and tighten the turning screw periodically.

Safety

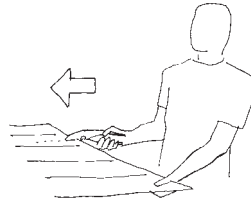
- Cut with shears away from the body.



- Hold down the metal plate well before the last cut to avoid being hurt by sharp edges.
- If right-handed, cut in such a way that the part to be discarded is on the right-hand side of the shears. Cut the other way round if left-handed.
- Only use your own manual strength to cut with the shears. Do not use other means to increase the force.



These shears are designed for cutting soft metal plate. Cutting rods, wires or nails may damage the blade of the shears.



The edges that have just been cut can cause injuries to the hand holding the shears. Be careful.

- Use gloves when cutting sheet metal.
- Use strong sheaths to transport the shears provided.

D.3.8 Nails



Iron nails, for wood, two sizes, 75mm long (3") and 40mm (1½")

Type	Iron nails, made of polished low-carbon steel; cold processed, not heat treated except for galvanization
Rustproof	Hot dip galvanized at 300g/m ² ± 10%
Tensile strength	Minimum 650N/mm ²
Shape	Flat, smooth, circular head; plain, round shank and diamond point
Dimensions (+/-5%)	Large type – length x diameter: 75 x 3.6mm, head diameter: 7.7mm, and Small type – length x diameter: 40 x 2.2mm, head diameter: 5.5mm

Packing	Packed in strong, thick plastic bag
Quantity	Net weight: 0.5kg per type

Use

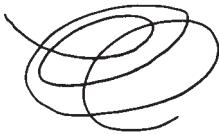
- There are two sizes of nail. Do not use the 75mm nails on bamboo. Check 40mm nails do not break the bamboo before starting to build.

Safety

- Old or broken nails should not be left on the ground as they can cause injury or puncture wheels.



D.3.9 Tie wire



Galvanised wire, 1.5 mm diameter, 25m length, roll

Material	Low carbon steel, galvanised binding / tie wire.
Quantity	Roll of 25m
Dimension	Diameter 1.5mm \pm 5%
Tensile strength	Minimum 500 N/mm ² to Maximum 700N/mm ²

Safety

- Wear gloves when using tie wire whenever possible.
- Fold the ends of the wire back to reduce the risk of injury.



D.3.10 Claw hammer



A 0.75Kg carpenters hammer with head and handle. The hammer head has one flat side and one claw side

Material	High-carbon steel head, treated to achieve a martensitic structure, with dressed striking faces
Quality of make	Smooth surface and edges with no dents or cracks; no excess metal in the eye
Weight of the head	750g \pm 1%

Hardness Rockwell C	50 minimum to 58 maximum HRC on striking faces
Hardness Rockwell C	35 maximum HRC closed to the eye
Handle	No chips, rough surfaces, holes or knots. Smooth, polished or varnished surface. Dry, strong, and flexible wood. Handle adapted to head so that it protrudes and can be blocked on other side with a metal wedge on the other side of the head. Moisture minimum 10%, maximum 15%, under ISO 3130.
Pull-apart test	After two series of 25 vigorous blows with varying delivery angle, secure head in a clamp, apply a minimum traction of 50kg trying to pull the handle out. This should not damage the hammer head or the handle, and the handle should remain firmly attached to the head.
Bending test	For the claw hammer only, apply a load perpendicularly to the axis of the handle and close to the end, so as to obtain a 125Nm torque, irrespective of the size of the hammer. Start the load at zero and increase gradually, without jerking. Hold the test load for at least 10s. This should not create any damage to the hammer head or handle.

Maintenance

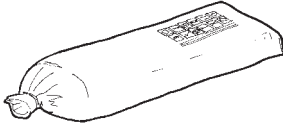
- To fix the hammerhead to the handle, insert wedges at an oblique angle to the axis of the hammerhead.
- To ensure that the hammerhead fits the handle tightly, you can submerge the hammer in water for approximately 20 minutes.
- With use, the hammerhead may deteriorate creating sharp edges. Where this happens, the hammerhead should be smoothed.

Safety

- Keep hands away from bangs by the hammer, where possible.
- Reduce the risk of injury by holding a nail near its head rather than near the surface of the timber.
- Regularly check that the hammerhead is fixed to the handle.
- Keep your eyes away from nails that are being hammered.



D.3.11 Packaging



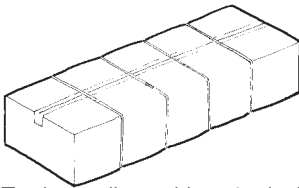
Polypropylene bag

Tarpaulins are not packed in this bag.

Material	New, woven polypropylene (PP), 80g/m ² minimum, both sides coated with PE or PP
Dimensions	1300 x 400mm ±10mm
Colour	White

This bag includes a copy of the content list for the shelter kit.

Carton



Each cardboard box includes two kits. Tarpaulins are packed separately.

Type	Double-walled corrugated cardboard.
Reinforcement	Corners reinforced with 4 double-walled, corrugated cardboard. Folded corners equal to the total height of the carton.
Dimensions	1.2 x 0.3 x 0.2m
Sealing	Sealed with adhesive tape plus four heat-sealed 10mm plastic straps.
Quality	Loaded cartons should withstand 2m-high stacking on pallets, and several handlings (both hand and forklift) without damage