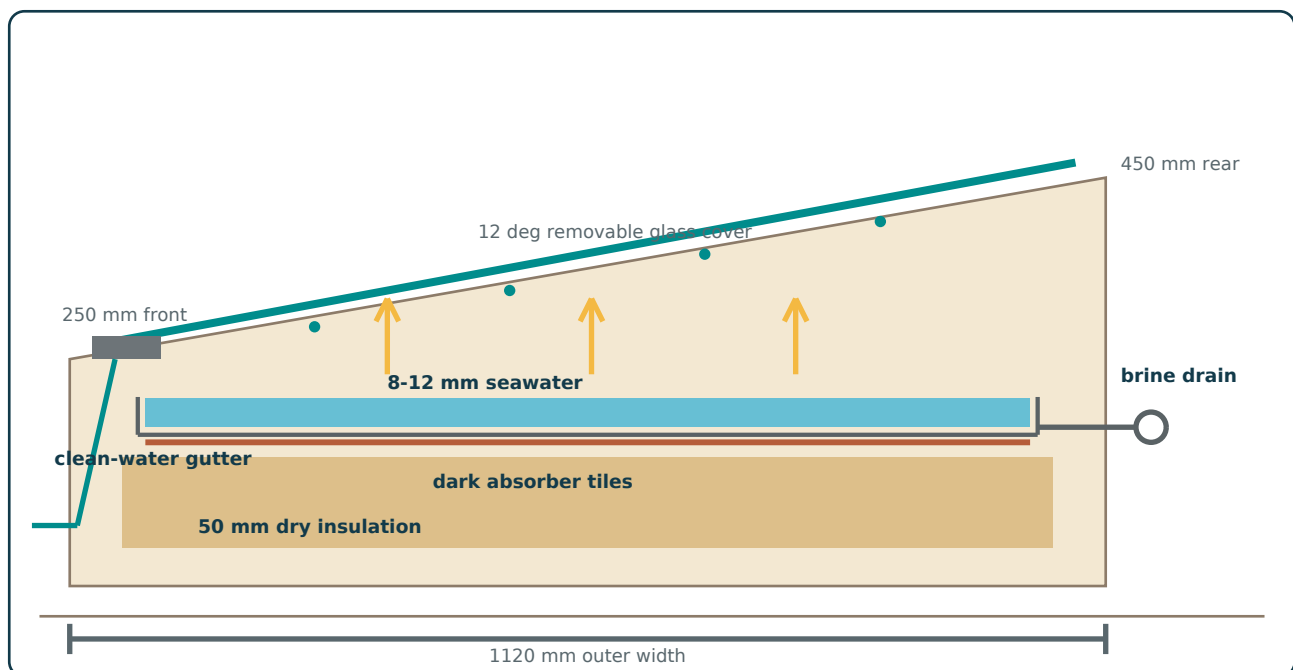


GWS-1: HAND-BUILT SOLAR STILL

A repairable one-square-metre field prototype for Guadeloupe

BUILD PURPOSE: turn seawater into test batches of distilled water using direct solar heat, no electricity, no pump, no pressurised boiler and no proprietary filter.

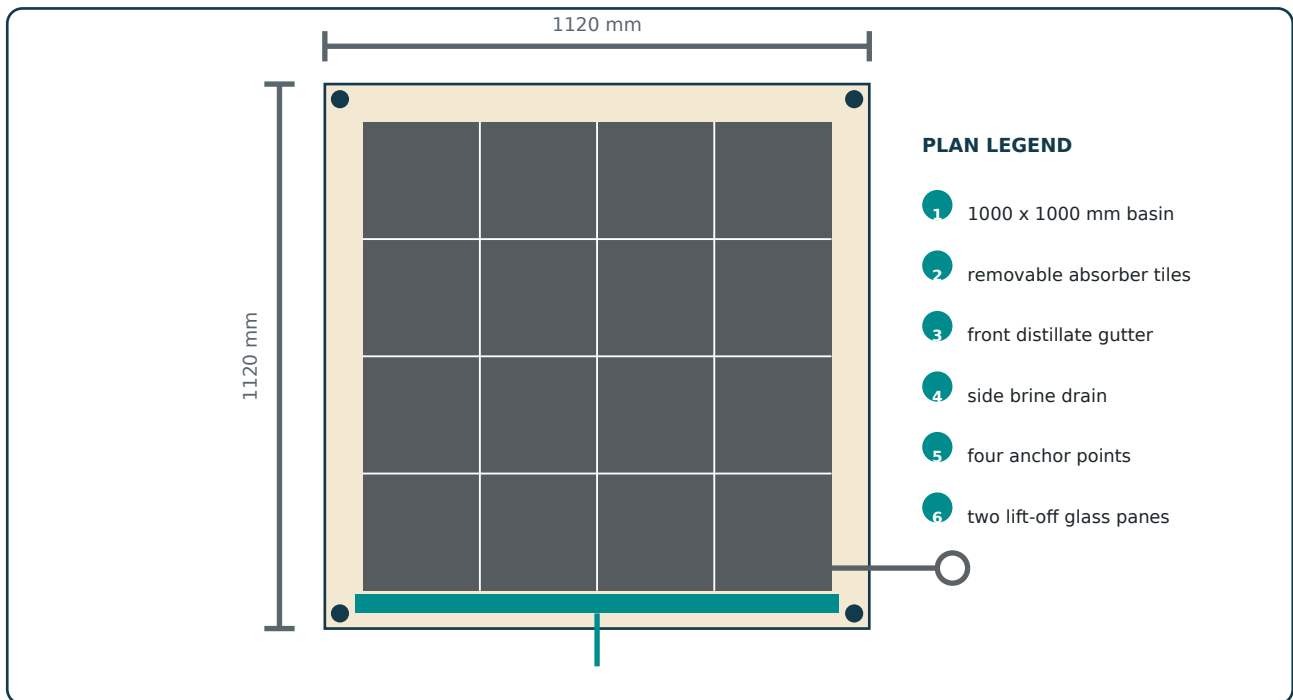
Prototype target	Design value
Active solar area	1.0 m ²
Expected field output	2.5-4.0 L/day typical; up to 5 L on favourable days
Morning feed	8-12 L settled and screened seawater
Operating pressure	Atmospheric only - permanent open safety vent
Power	None
Moving parts	None
Daily service	Fill, collect, drain brine, rinse



PROTOTYPE STATUS: do not describe the output as potable until the completed device, product water and storage route have passed laboratory microbiological and chemical testing. Distillation does not reliably remove volatile fuel, solvent or pesticide contamination.

1. DIMENSIONED BUILD DRAWING

The ancient basin-still principle is flattened into a square tile. A shallow layer of seawater receives sunlight through removable glass. Vapour condenses on the cooler underside and runs into a separate clean-water gutter.



Part	Nominal dimensions	Tolerance / reason
Outer body	1120 x 1120 mm	+/- 10 mm; hand-built masonry or modular fired clay
Evaporation basin	1000 x 1000 x 35 mm	316L sheet, corners continuously TIG welded
Feed depth	8-12 mm	Shallow water heats faster; never allow dry operation
Glass cover	Two panes, each about 525 x 1080 x 4-6 mm	Tempered glass; overlap or centre gasket over a support rib
Cover slope	12 degrees	Enough for condensate drainage; rear about 200 mm above front
Distillate gutter	25 mm deep V or U channel	Inside low edge, physically separated from brine
Brine drain	20 mm full-bore valve	No narrow salt-blocking passages
Product outlet	12 mm food-grade pipe	Continuous fall to sealed collection vessel
Safety vent	Minimum 8 mm bore	Always open, downward-facing, insect-screened

The transparent cover is removed and stored indoors before cyclone conditions. The low body remains bolted to a concrete pad. Do not attempt to make exposed glass hurricane-proof.

2. MATERIALS AND LOCAL MANUFACTURE

Minimum bill of materials

Item	Quantity	Preferred specification	Localisation
Outer body blocks/sections	1 set	Fired local clay-chamotte or hand-cast ferrocement	Local
Dry insulation	50-70 L	Clean expanded clay, pumice, scoria or coarse chamotte	Local if qualified
Evaporation tray	1	1.0 m ² , 316L stainless, 0.8-1.2 mm sheet	Imported sheet; local fabrication
Dark absorber tiles	About 0.9 m ²	Thin dark fired-clay/basalt tiles; feed-water side only	Local
Tempered glass	2 panes	4-6 mm, smooth edges	Standard/imported; locally cut before tempering
Clean-water gutter	1 m	316L stainless	Local fabrication
Gasket	4.5 m	Food-grade silicone or EPDM	Stocked/imported
Product pipe	As needed	Food-grade HDPE/silicone, 12 mm	Stocked
Brine drain and valve	1 set	20 mm full-bore, salt resistant	Stocked
Compression clamps	6-8	316 stainless or replaceable exterior hardware	Local/stocked
Anchor bolts	4	M10 minimum	Local/stocked

Starting ceramic recipe - test pieces before full production

Ingredient	Starting fraction	Function
Basse-Terre common clay	45% by dry mass	Main body
Local chamotte, 0.2-1.5 mm	40%	Reduces shrinkage and cracking; made from broken fired clay
More plastic binding clay	15%	Improves forming; qualify a suitable local source

Dry slowly under shade. Fire trial coupons and small sections first, initially around 1000-1050 deg C. Measure drying shrinkage, firing shrinkage, water absorption, warping and thermal shock. Use clean wood ash only in separate experimental test tiles at 0%, 2%, 5% and 10%; it is a flux, not a substitute for chamotte.

Keep the locally variable clay body outside the clean-water path. The distillate should touch only qualified glass, stainless steel, food-grade gasket and food-grade pipe.

3. HAND-BUILD SEQUENCE

1	Make the foundation	Cast a level 1250 x 1250 mm reinforced pad above known flood level where possible. Install four anchor points. Do not site in storm-surge, landslide or normal flood flow paths.
2	Form the low body	Build the 1120 mm square body from interlocking fired-clay sections or ferrocement. Keep the front low and the rear about 200 mm higher so the cover slopes 12 degrees.
3	Add dry insulation	Place 50 mm of clean dry scoria, pumice, expanded clay or chamotte beneath and around the basin. Keep drain routes clear.
4	Fit the basin	Place the removable 316L tray on level supports. Fit the 20 mm brine drain at its lowest corner. Water-test every weld before assembly.
5	Lay absorber tiles	Cover most of the tray floor with removable dark tiles. Leave gaps for flushing and access to the brine drain.
6	Fit the clean gutter	Mount the clean-water gutter beneath the inside of the low glass edge. Give it continuous fall to the 12 mm product pipe. Ensure brine cannot splash into it.
7	Fit the glass frame	Apply a continuous food-grade gasket. Add a central support/gasket for the two panes. Use clamps that release without tools or with one common spanner.
8	Fit the safety vent	Install an always-open, downward-facing vent of at least 8 mm bore at the upper rear. Add removable insect mesh. Never fit a shutoff valve.
9	Connect temporary collection	For trials, run the product pipe into a sealed graduated food-grade container rather than the public storage network.
10	Leak and separation test	Fill the feed basin with dyed non-toxic test water. Confirm that no dye enters the clean gutter or container. Rinse fully before production tests.

4. OPERATION, CLEANING AND STORM MODE

When	Action
Before filling	Inspect glass, gutter, outlet, vent and basin. Reject feed affected by fuel, solvents, sewage, algal decay or unknown chemical contamination.
Morning	Screen and settle seawater. Add 8-12 L to give an 8-12 mm layer. Record starting volume and time.
During operation	Keep the still closed but never block the vent. Do not add water if it could splash into the clean gutter.
Evening	Measure product volume, conductivity/TDS, pH and appearance. Label the batch. Drain all concentrated brine back to a suitable marine discharge point with local environmental approval.
Daily after use	Rinse basin, absorber tiles, brine valve and feed tools with clean water. Keep the product path separate.
Weekly	Lift the glass, scrub salt scale with approved non-toxic method, inspect seals and clean the product gutter.
Cyclone warning	Empty both sides, disconnect pipe, release clamps, remove glass and all loose components, store them indoors, cap buried pipework and secure the remaining body.

Thirty-day acceptance test

- Operate for at least 30 usable days, including clear, cloudy and rainy conditions.
- Record feed volume, product volume, hours of useful sun, air temperature, humidity, wind, rainfall and cleaning time.
- Reject any day affected by a known leak, spill or measurement error, but record the fault.
- Send product water from early, middle and late trials to an accredited laboratory.
- Pass target: median output at least 2.5 L/m²/day, no brine crossover, and routine cleaning completed in under 10 minutes.
- Only after water-quality approval should a remineralisation, disinfection and ACS-compliant storage stage be connected.

Do not connect an unvalidated prototype directly to buried community storage. A bad prototype must contaminate only its labelled test container, never the common reserve.

5. FIELD LOG AND SCALE-UP DECISION

[illegible]

Verified median output	Modules for 24,000 L/day drinking supply	Active area
2.5 L/module/day	9,600	9,600 m2
3.0 L/module/day	8,000	8,000 m2
4.0 L/module/day	6,000	6,000 m2
5.0 L/module/day	4,800	4,800 m2

The household tile proves materials, yield and maintenance. Community scale should use the same tray, gasket, gutter, drain and testing standard in larger shared arrays. Do not multiply an inefficient design before the field median is known.

Reference basis

- BRGM, Argiles de la Guadeloupe: inventaire, caracterisation et usages, RP-54917-FR (2006).
- WHO, Safe Drinking-water from Desalination (2011).
- ARS Guadeloupe, Dispositifs de stockage d'eau - recommandations sanitaires (updated 2025).
- Meteo-France Guadeloupe climate bulletins and natural-hazard records.

Design intent: open, locally repairable field development. Before commercial production, obtain local engineering review, food-contact material review, environmental discharge approval and applicable French/EU product and drinking-water compliance advice.