



RAINWATER RECYCLING AND DISTRIBUTION SYSTEMS



A precious resource

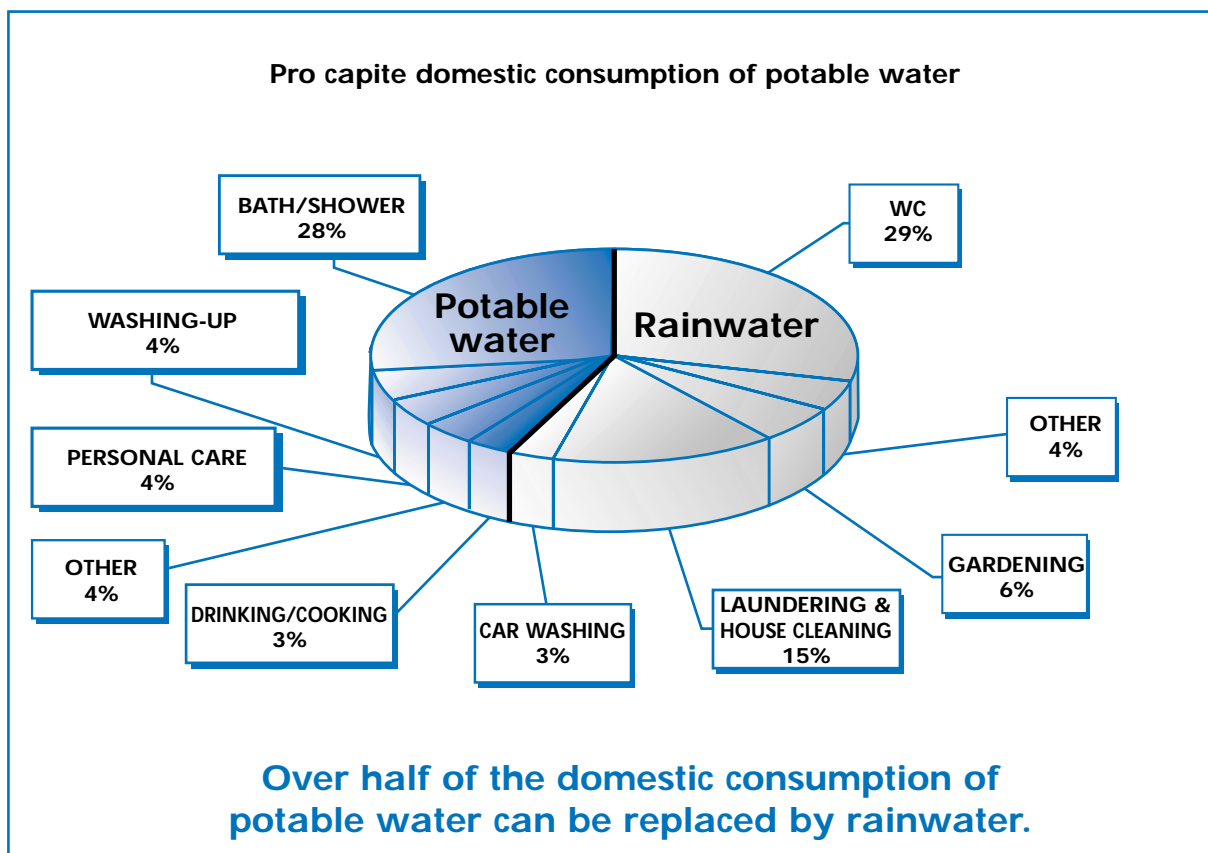
Over 97% of the total 1,4 million Km³ of water on Earth is sea water, and cannot be used for human consumption. The remaining 3% consists of ice for the vast majority, and is concentrated at Polar caps. The remaining part accounts for only 0,3% of the total and is available for human consumption. Such percentage is progressively reducing because of the pollution generated by human activities. In addition, irregular, less frequent and often too abundant rainfalls, do not consent a regular supply from municipal water main.

Why recycle rainwater?

Using rainwater represents a precious contribution to reduce wastes of potable water, leads to a more conscious consumption and may reduce costs up to 50%.

Rainwater is particularly suited for the following usages:

- For the washing machine and house cleaning: rainwater does not contain lime and cleans better than potable water so as it can reduce the use (and cost) of detergents up to 50%;
- For gardening: rainwater, when used to water plants and flowers, allows a better absorption of minerals.;
- For the toilet: rainwater reduces the formation of lime.





BENEFITS OF RECOVERING

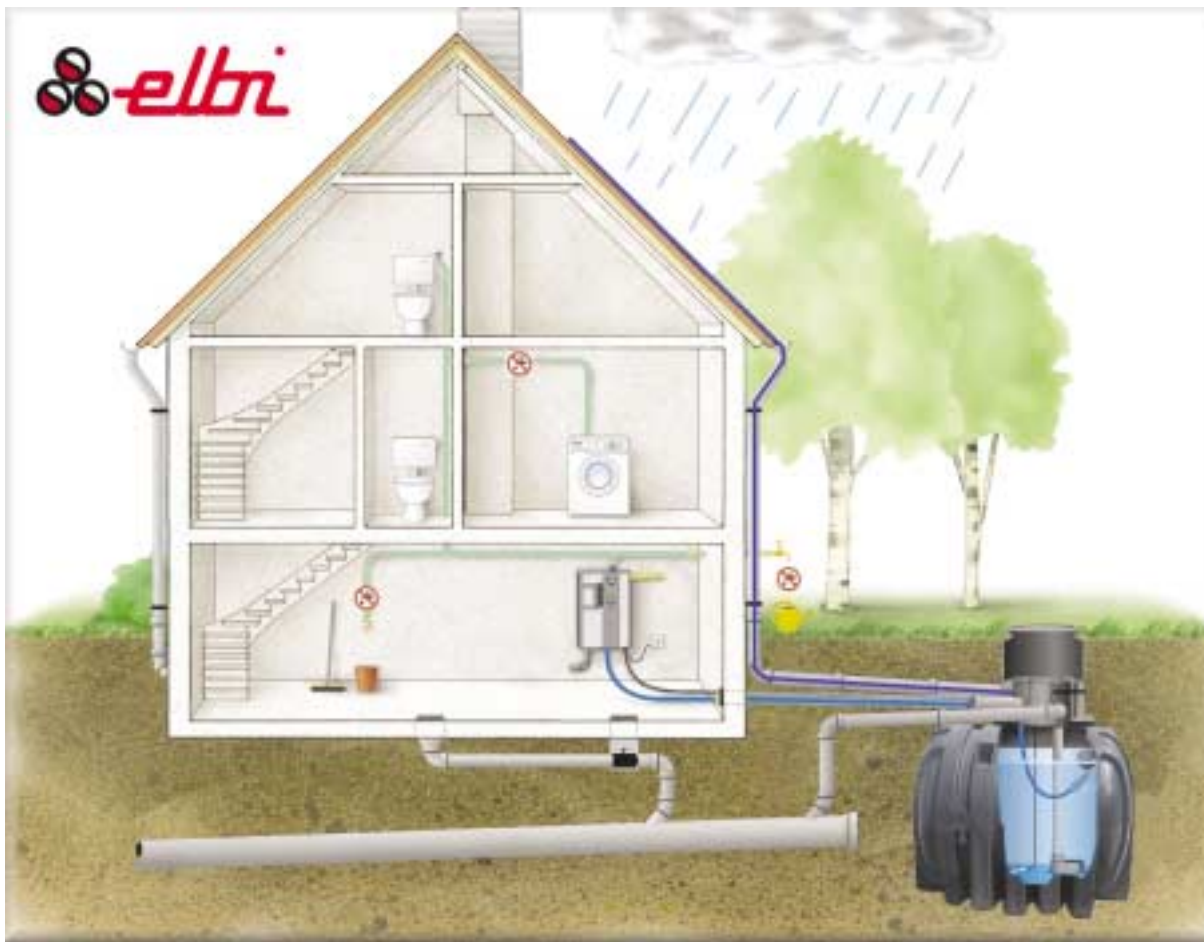
RAINWATER

AVERAGE CONSUMPTION OF WATER FOR DOMESTIC USE:

- Cycle of a washing machine: 80-120 litres;
- Washing-up: 20 litres;
- Toilet flush: 10 to 16 litres;
- Cleaning of floors: 25 to 30 litres;
- To take a shower (10 minutes): approx. 100 litres;
- To wash one's teeth: 2 litres;
- To fill a bath-tub: 120 to 160 litres;

For the major part of the above consumptions, using potable water represents a waste of useful resources and a waste of money.

The rainwater recycling system



How it works:

The system is designed to collect rainwater in order to make it available for use in household applications (toilets, washing machines, garden irrigation, domestic cleaning, etc.). It consists of an underground tank, a filtering system and a control unit.

Rainwater is channelled from the roof to the gutter; it then flows through a pipeline to the filter inside the underground tank. The filter, which has a stainless steel strainer inside, is inclined so as impurities are forced through the sewer. Leaves, insects and other impurities are hence eliminated. Water then flows inside the settling tank through a pipe which has a decanter at the bottom in order to prevent turbulences that would move sediments on the tank's bottom.

Water is taken 15 cm below the water level by means of a flexible hose equipped with a float switch in order to suck only pure water.

A control unit consisting of an electric panel and an integrated pump control the entire system from inside the house. The control unit also controls the inflow of the water main in case the supply of rainwater from the tank is entirely spent.

A natural balance

- Oxygenated environment
- Fresh temperature
- Absence of light

These are the three mandatory conditions for the proper operation of the rainwater collection system.

The temperature is fresh inside the underground tank, with no thermal shocks. Oxygen favours the proliferation of bacteria who mineralize the sediments on the tank's bottom, keeping water pure. Absence of light prevents growing of weed, helping to maintain a natural balance.

Sizing of the underground tank

To properly calculate the size of the underground tank for your application, use the following directions:

YIELD OF RAIN (R)

Projected roof surface (S)

The projected roof surface is equal to the building's base, regardless of the shape and roof inclination.

Precipitation values (Vp)

Local precipitation value indicates the annual rain quantity. Such information is usually available from the local authority or at the nearest meteorological station. (average: 1.000 l/m²)

Roof cover factor (Vt)

Roof material	Value
Roof tile	0,9
Cement or slate roofing	0,8
Plain roof with ballast	0,6
Green roofs	0,4

$$R = S \text{ (m}^2\text{)} \times Vp \text{ (litres/m}^2\text{)} \times Vt$$

WATER REQUIREMENTS (Fi)

Use	Per year average requirement	Nr.	Water requirement (Fi)
WC	9.000 litri	x persone	+
Lavatrice	5.000 litri	x persone	+
Pulizie domestiche	1.000 litri	x persone	+
Giardinaggio	450 litri/m ²	x m ²	+
Altro			=
TOTAL Fi			litres

Values suitable for larger systems:

- School = 1000 l/person;
- Office space = 1.500 l/person

The calculation factor (FC) is the lowest between the yield of rain (R) and water requirement (Fi).

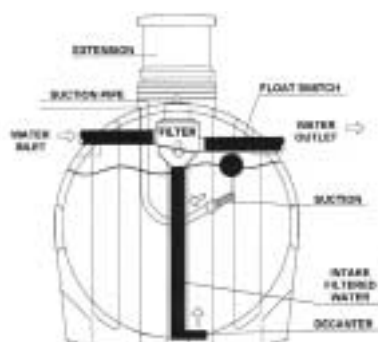
The constant (K) is 0,0625.

The minimum volume for the underground tank (V) will be:

$$V = FC \text{ (litres)} \times K$$

Before installing the system it is recommended to check with the local municipality about regulations (if any) concerning the use and treatment of rainwater (in example: sanitization regulations, separation from potable water systems etc.)

Elbi's systems: technical data and features



RAIN BASIC – PREASSEMBLED TANK WITHOUT CONTROL UNIT

Model	Part number	Nominal capacity (litres)	Equipment
CU 3000-B	A520074 V0000	3.000	Standard equipment*
CU 5000-B	A520080 V0000	5.000	Standard equipment*
CU 10000-B	A520092 V0000	10.000	Standard equipment*

RAIN PLUS – PREASSEMBLED TANK WITH CONTROL UNIT

Model	Part number	Nominal capacity (litres)	Equipment
CU 3000-B	A520074 V0000	3.000	Standard equipment*
CU 5000-B	A520080 V0000	5.000	Standard equipment*
CU 10000-B	A520092 V0000	10.000	Standard equipment*

Standard equipment:* (factory-assembled) Extension; Suction pipe with float switch; Decanter;

Not included in standard supply:

- Hydraulic components (pipes, connectors, silicon etc.), electrical wiring, excavation and other construction works, installation and anything else not expressly indicated.

Tanks – Technical data

Model	Part number	Weight (Kg)	Diameter (mm)	Length (mm)	Height (mm)	Inspection opening (Ø)
CU 3000	1720551	133	585	1920	1850	500
CU 5000	1720557	193	1860	2380	2150	500
CU 10000	1720563	383	2130	3410	2140	700

Accessories – Technical data

Model	Part number	Weight (Kg)	Inspection opening (Ø)	Height (mm)
Extension for CU 3000 and 5000	7081200	8	500	430
Extension for CU 10000	A5G0092	9	700	450
Housing for CU 10000 (cube)	1721040	45	700	1000

Instructions for underground installation of CU Series tanks

Guidelines:

1. The maximum depth should never be more than 80 cm.
2. The immediate surroundings of the storage tank should not be used as transit area; in the presence of a sump pit, it should not be made of brick, cast iron or concrete and the total weight should not exceed 100 Kg (See fig. 1).
3. The storage tank should never be laid in an uneven slope and the surrounding earth should not generate unbalanced lateral movements.
4. In case that the water bed is higher than the bottom of the storage tank, it is mandatory to provide a concrete wall insulation.
5. The storage tank cannot be used in open ground; should you decide to do so, it is necessary to prepare an adequate containing structure to balance the pressure of the water inside the tank and prevent structural failure. Warranty is void if CU series tanks are used in open air.
6. In case that it becomes necessary to ensure the hydraulic tight connection between the cover, the extension and/or the sump pit, it is appropriate to seal the threads with silicon or other suitable material.

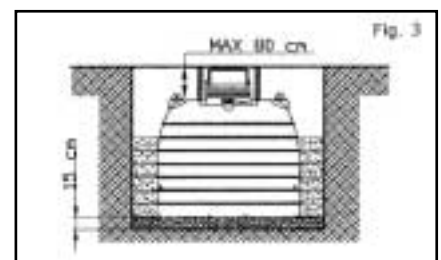
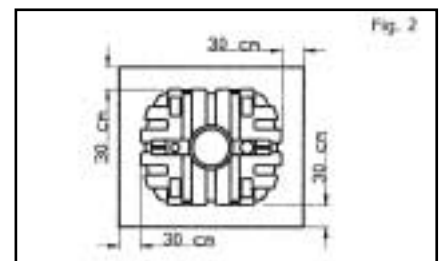
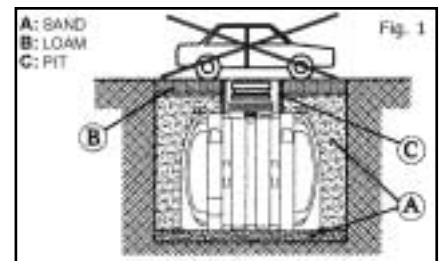
For a proper underground installation follow these instructions:

1. Excavate a hole of appropriate dimensions; allow a space of approximately 30 cm around the tank (See fig. 2).
2. On the bottom of the hole prepare a sand layer with a thickness of at least 15 cm., so that the storage tank will lie on a flat base.
3. Prepare the connections and insert the storage tank horizontally into the hole.
4. Make sure the storage tank is equipped with a breather pipe adequate to the flow rate of the pump to avoid depression.
5. Test the prepared connections (at this stage do not fill the tank over 15 cm).
5. Fill the hole around the storage tank with 15 cm of well compacted sand.
6. Proceed by making layers of 15-20 cm at a time by first, filling the storage tank with water, then by filling the hole with sand/loam; make sure the material is well compacted (See fig. 3).

Important notice: an incorrect underground lying of the storage tank may cause structural deformation, this will void the warranty.

Installation and maintenance notes

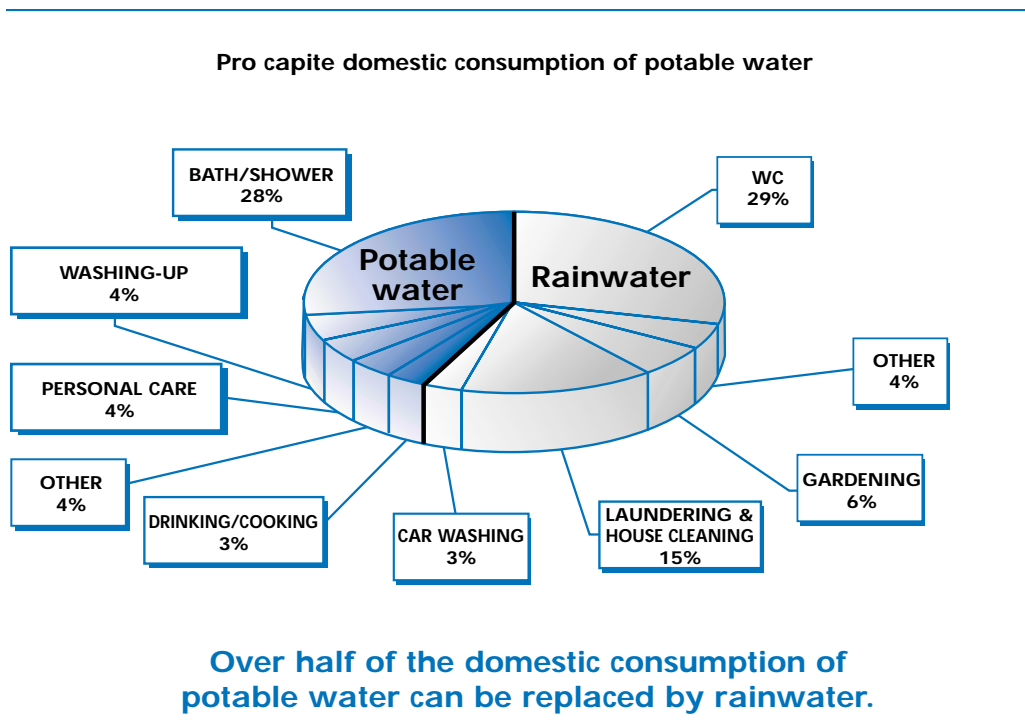
1. Check the tank integrity and fittings prior to starting installation. When necessary remove the plastic locking from the concerned connector.
2. When planning for installation, make sure that no heat source is located in the surrounding area of the storage tank.
3. Make sure the storage tank is placed perfectly horizontally.
4. Whenever possible, avoid building walls or any other permanent structure that may obstruct maintenance or replacement of the tank.
5. Make sure to obscure the overload opening to prevent access of light (ensure proper functionality of the opening) as this may lead to algae growth.
6. Plan for regular cleaning of the inside of the storage tank
7. Our PLASTO storage tanks are manufactured using special polymers expressly formulated to guarantee resistance to ultraviolet rays. Therefore, if properly installed, even in the event of exposure to sunlight, the PLASTO series tanks are not subject to the formation of algae.
8. If the tanks are used as storage for running water, ensure that the purge pipe is provided with open air flow, maintains a straight run and be as short as possible.
9. Make sure that the gaskets are suitable for the liquid content inside the storage tank



Installation of the system

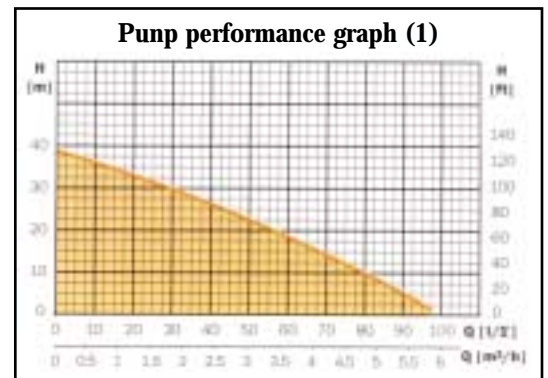
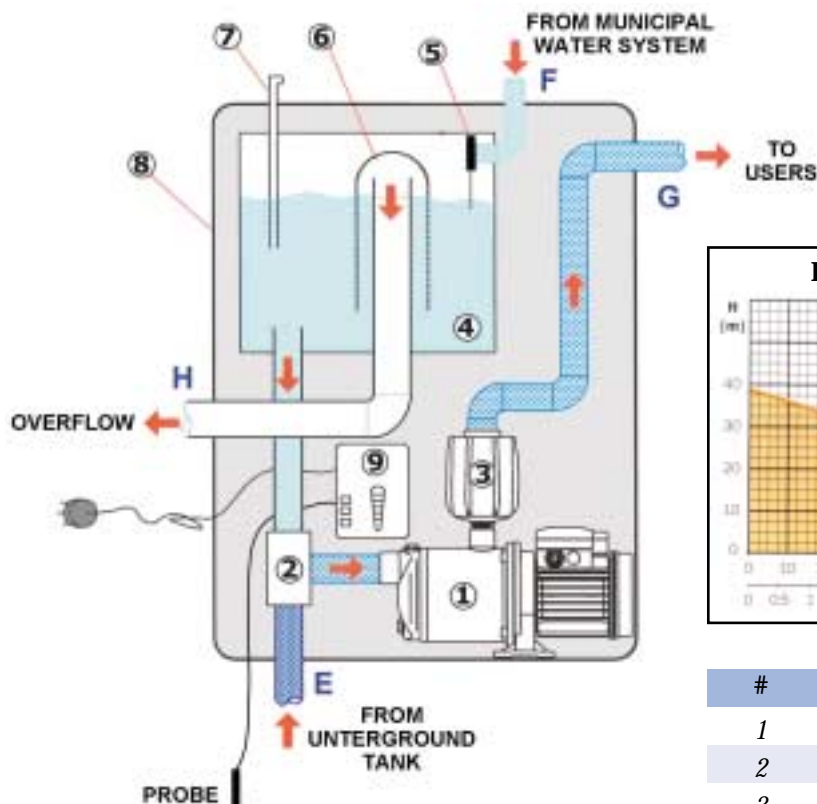
1. Before proceeding with the installation of the rainwater collection system, it is mandatory to evaluate the hydro-geological and morphological characteristics of the ground;
2. Carefully observe the instructions for underground installation of the CU Series Plasto tanks (instructions are printed on page 3 and stamped on the tank itself).
3. Connect the intake pipe DN 100 already pre-assembled in the tank (POS. A – INTAKE FROM THE GUTER) to the duct coming from the gutter to recuperate rainwater. The pipe connecting the gutter to the tank must be properly inclined so as to favour the flow of rainwater to the underground tank.
4. Connect the discharge pipe DN 100 already pre-assembled in the tank (POS. B – DRAIN) to the discharge pipe. The discharge pipe must be properly inclined in order to help draining impurities and the non filtered water.
5. Install a non return valve inside the discharge pipe so as to prevent the return of discharged water and do not allow animals or insects to enter the tank (POS. C – NON RETURN VALVE).
6. Connect the suction pre-assembled suction (1") from the tank (pos. D – SUCTION PIPE) to the pump or to the control unit.
7. Insert the wiring of the probe (level indicator) inside the tank keeping the lower side at a distance of approximately 25/30 cm. from the bottom.

NOTE: The system doesn't need an overflow pipe as the excess water is discharged directly through the discharge pipe (POS. B). Installation of an overflow pipe is recommended only in areas with high concentration of pollen.



Installation of the control unit

1. Prearrange a wall inside the house and secure the control unit to it.
2. Connect the suction pipe from the tank to the control unit's intake pipe (pos. E – intake from tank);
3. Connect the suction pipe from the municipal supply (pos. F – intake from municipal supply);
4. Connect the pipe from the control unit (pos. G – to users) to the users (toilets, washing machine, garden watering, etc.);
5. Connect the overflow pipe to the discharge pipe (pos. H – drain);
6. Connect the probe's wire (levl indicator) to its connection at the contr .
7. Plug the control unit to the electrical supply.



#	Description
1	Pump
2	Electro-valve
3	Press Control
4	Potable water tank
5	Float switch
6	
7	
8	Cover
9	Electric panel

Notice: The control unit must be installed indoors, in a safe and dry position.

Technical data (control unit)

Unit	Part number	Weight (kg)	Height (mm)	Width (mm)	Depth (mm)	Connections:		
						F	E - G	H
Model S	L3A0000	27	760	580	285	1/2"	1"	DN 50
Model F	L3A0010	28	760	580	285	1/2"	1"	DN 50

All control units are manufactured according to EN-1717

How it works

The control unit (9) controls the system's functions and guarantees a continuous operation.

It also regulates the intake of potable water from the municipal supply in case the rainwater stored in the tank is drained or in case the user wants to use potable water instead of rainwater.

Such process is regulated by an electro-valve (2) which commands the pump (1) to suck water either from the underground tank or from the small reservoir (4) inside the control unit.

These two independent water reserves ensure the continuous operation of the system. The switch can be commanded manually from the control unit or automatically (through the probe that senses the level of rainwater inside the tank) when the tank does not contain a sufficient amount of water.

The operative mode is indicated by a led.

The control unit is equipped with a free drainage according to UNI EN 1717.

Features of the control unit (models S and F):

Control units are fitted with an electronic device and with a multi stage inoxidizable centrifugal pump and a small tank.

They are also fitted with an automatic system to switch water suction from the tank to the municipal supply in case the rainwater reserve is completely spent. In case of need such operation can be also performed manually by means of a switch.

All control units are equipped with several safety devices according to UNI EN 1717.

Additional features of control unit model F:

- √ This control unit is equipped with a microprocessor with the following functions:
- √ Signals possible malfunctions of the systems via optical and acoustical indicators;
- √ Shows the water level (in percentage) of the water content inside the tank;
- √ Periodically replaces the water inside the small tank inside the control unit in order to prevent stagnation in the pipes of the potable water supply;
- √ Allows the installation of an additional water pump;
- √ Allows the connection to the serial port of a personal computer;

Technical features of the control units (Models S and Model F)

Max Flow Rate	65 lt. /min.
Head	36 mt.
Water Temperature range	+ 5°C - + 35°C
Maximum Working Pressure	10 bar
Maximum static pressure	18 mt.
Electric Output	230 V AC / 50 Hz
Electric Input	805 W
Safety standard	IP 42
Environment acceptable temperature	+ 15°C- + 35°C
Installation acceptable conditions	Indoor in humidity-free conditions
Pump materials	Stainless steel/ Noryl/ PP/ light metal
Municipal water connection fitting	3/4"
Tank water connection fitting	1"
Overflow connection fitting	DN 50
Pressure sensor	20 mt (the wire cannot be buried)
Float switch	20 mt (the wire cannot be buried)

Warranty terms for the underground tank

All PLASTO tanks are guaranteed against through corrosion for 20 years. Warranty is valid for one year against defects in material and workmanship. The warranty is effective from the date of shipment as indicated by the bill of lading.

If installed according to Elbi's technical guidelines, the storage tanks are also guaranteed against any kind of algae growth.

The warranty excludes:

- costs of installation
- claims for consequential loss or damage
- any damage to third parties
- any damage consequent to leaks from (storage) tank
- cost of transportation
- damages caused by improper use, use of chemicals or other non food-related liquids.

If it is necessary to ensure an hydraulic tight connection between the cover, the extension and/or the sump pit, it is appropriate to seal the threads with silicon or other suitable material.

NOTICE: All tanks, when supplied with a pre-assembled extension, must be stored and installed with the extension fixed onto the tank's hatch.

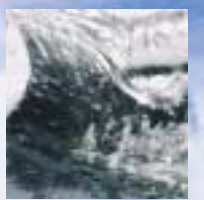
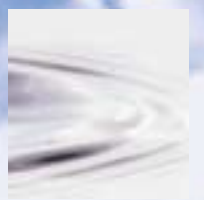
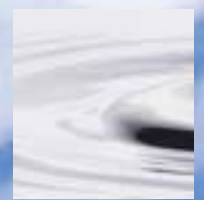
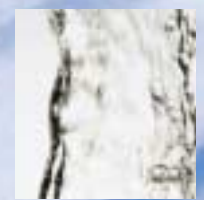
IMPORTANT NOTICE: an incorrect installation can cause structural damages to the tank and voids warranty. For further information please contact our sales office.

Directions for ordinary maintenance

- √ Periodically clean the filter inside the tank as follows:
 - Open the hatchway of the tank and open the filter's cover. Remove the stainless steel grate paying attention to not let residuals fall inside the tank;
 - Clean the grate under running water removing any and all impurities;
 - Replace the grate in its slot, replace the filter's cover and close the hatchway.
- √ Periodically check the transparency and odour of the rainwater stored into the tank.
- √ Perform a throughout cleaning of the tank every 5 to 10 years (upon need).
- √ Periodically check tightness of all connections and wirings.

Recommendations and notices:

- Do not use the rainwater recuperation system for uses different than the one originally intended.
- The water supplied by this system is NOT potable.
- In case of malfunctioning of the system, switch it off and contact your installer immediately.
- In case of black-out or temporary interruption in the electric power supply the control unit does not work.
- You may connect the control unit to a UPS device or create a bypass so as to intake water from the municipal supply. Check local municipal codes to be sure you can do this in your area.
- Before proceeding with the underground installation it is recommended to verify the hydro-geological condition of the ground and its stability.
- It is recommended to read carefully the installation instructions supplied with the system.
- Installation must be performed by a qualified professional installer.
- Proper installation and a regular cleaning of the filter ensure proper system's performance during time.



STAZIONE Sperimentale per l'Industria delle Confezioni Alimentari
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Forma, 8 settembre 2004
 Rapporto di prova N. 1736
 LIP/ - Pag. 1 di 1

Spett.le Ditta
ELBI S.p.A.
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 35010 LIMENA PD

PROVE DI MIGRAZIONE SU POLIETILENE
 N. L. Art. del 25/05/2004

Si riferisce nell'ambito delle analisi effettuate nel campo prove con data 7 giugno 2004 a mezzo contratto e costituito da:

- n° 15 prove in 30 con in polietilene di colore scuro ottenuto al contatto con:

Zincherio caduto: migrazione globale e migrazione residua
 Idrologico organico: metodo riportato sul D.M. 24/3/73 (modificato dal D.M. 26/09/97, n. 220 e 22/9/98, n. 339)
 Simulanti da impiegare: in confezione sigillata di modo netto al 5% p/v
 C. salino all'ora al 15% p/v in soluzione acquosa
 Analisi istoria G 10/7/01 e annotata al 10/04/02

Condizioni di prova

Condizioni di prova	Risultati	Limite
Migrazione globale (a 40°C/540h)	1,8	20
- nel simulante M (acqua)	0,8	10
- nel simulante C (acqua)	0,3	5
- nel simulante D (acqua)	0,3	5
Migrazione idrologica: idrominerali organici, in peso di base fra 400 - 750 mg, nei simulanti	0,5%	max = 90%
proveniente dalle prove di migrazione globale		
il rapporto superiore rispetto (con) a valore simulante (m) = 0,8		

Valori limite previsti dal Decreto Ministeriale 21 marzo 1973 (Chiusura igiene degli imballaggi, recipienti, contenitori e norme in contatto con le sostanze alimentari e con norme d'uso personali) e successivi aggiornamenti derivanti dal recepimento in decreto direttiva CE, da ultimo dalla Direttiva 90/12/CE.

Il Responsabile del Laboratorio
 [Firma]

La Direzione
 [Firma]

I risultati di riferimento concernono il campione esaminato.
 Il presente rapporto non può essere riprodotto parzialmente.