Drainage and Seepage Tank

PDFD

PROCESS DIAGRAM AND UNIT ELEMENTS ALLOCATION
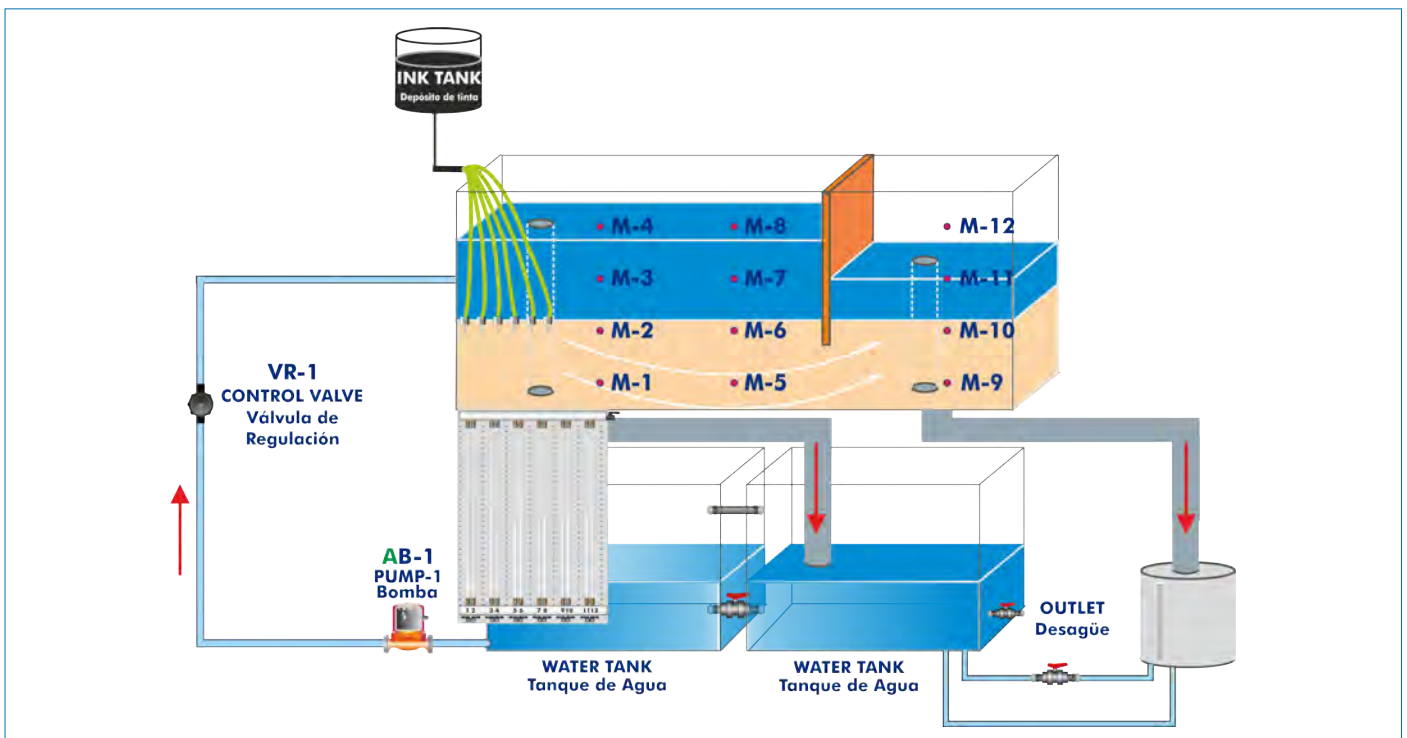
INK TANK
Depósito de tinta

M-4   M-8   M-12
M-3   M-7   M-11
M-2   M-6   M-10
M-1   M-5   M-9

VR-1
CONTROL VALVE
Válvula de
Regulación

AB-1
PUMP-1
Bomba

WATER TANK
Tanque de Agua

WATER TANK
Tanque de Agua

OUTLET
Desagüe

INTRODUCTION

In Hydrology, infiltration is the process by which surface water is introduced into the inner layers of the soil due basically to gravitational forces, although capillary forces also intervene as well as others of a more complex nature such as chemistry, etc.

The infiltrated water can reach the aquifers, rivers, lakes or the sea, or it can be retained in the soil and return to the atmosphere by evaporation and/or transpiration phenomena.

Infiltration depends on the morphology and composition of the soil. The more permeable a soil is, the greater the infiltration. In a first stage it satisfies the deficiency of humidity in the soil in an area close to the surface, and later, once a certain level of humidity is exceeded, it becomes part of the subway water, saturating the empty spaces.

Within the engineering is important to study the effect of infiltration flows when passing through hydraulic structures, due to the thrusts, efforts, etc. It is also important to study to protect groundwater and avoid contamination by products used for agricultural treatments that are dissolved in water, etc.

GENERAL DESCRIPTION

The Drainage and Seepage Tank, "PDFD", unit has been designed for the practical demonstration, visualization and experimental study of the flow through permeable media and flows in subsoil.

The "PDFD" unit basically consist of a tank (soils container) to contain the sand, lower water tanks, a pump for the water flow, pressure meters, a dye injection system with dye injection needles.

The soils container consists on a rectangular tank, with back side in aluminium and front side in methacrylate to see the flow lines. It contains the wet sand which must be collected or sampled by the student.

The sand distribution in the tank must be according to the experiment configuration which we want to carry out. For it, there are overflow pipes to be able to put them at different heights, and going up and down the tubes.

The outlet tubes of the overflow pipes make easier the water falling to the tank which has a level switch and a key in order to the lower water tanks go out. The water flow can be measured.

PDFD detail

A set of typical models is included: a sheet pile wall, two mesh gates and a mobile accessory for pressure measurement, for pressure fall measurements tests, phreatic layer tests, earth dam, etc.

To check the flow lines, there is a dye injection system. This system has a dye vessel and injection needles through where the liquid flows and which are inserted in the sand in the tank, close to the methacrylate side for the flow visualization lines.

SPECIFICATIONS

Mobile bench.

Anodized aluminum frame and panels made of painted steel.

The unit includes wheels to facilitate its mobility.

Main metallic elements made of stainless steel.

Diagram in the front panel with distribution of the elements similar to the real one.

Rectangular tank (soils container), with front side in methacrylate and back side in aluminium, to cantain the sand. (Sand not included).

Two overflow pipes in the tank.

12 pressure tappings joined to a manometric tubes panel.

Feed water tank (capacity: 75 l).

Water pump: 0.37 KW, 30 – 80 l/min at 20.1 – 12.8 m.w.c

Control valve to regulate the water flow.

Water colletion tank (capacity: 75 l). This tank is connected to the feed water tank. It includes a system to avoid the passing of sediment to the previous one.

Samples colletion tank. It includes a level sensor and a valves to control the emptying process.

Dye injection system: with dye vessel, with eight dye injection needles and regulation valve.

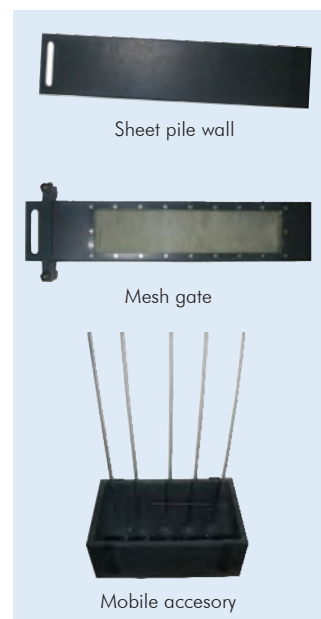Set of typical models:

   Sheet pile wall.

   Two mesh gate.

   Mobile accessory for pressure measurement.

Cables and Accessories, for normal operation.

Manuals:

   This unit is supplied with the following manuals: Required Services, Assembly and Installation, Starting-up, Safety, Maintenance & Practices Manuals.

Set of models included

Sheet pile wall

Mesh gate

Mobile accesory

EXERCISES AND PRACTICAL POSSIBILITIES

1.- Flow net construction.

2.- Flow line visualisation.

3.- Verification of Darcy´s Law.

4.- Comparison of experimental results with analytical solutions.

5.- To determine seepage rates.

6.- Seepage through an earth dam.

7.- Seepage underneath a sheet pile wall.

8.- Control of seepage through permeable soils by sub-soil drainage.

9.- To reduce uplift pressure and lateral thrust by drainage.

10.- Distribution of uplift pressure on hydraulic structures.

11.- Behaviour and formation of "quicksands".

12.- To drain an excavation site using wells.

13.- Stability of an earth dam.

14.- Comparison of permeability according to the grain size.

15.- Sheet pile wall:

    Study of the soil permeability.

    Flow lines visualization.

    Calculation of the equipotential lines

    Pressures distribution.

16.- Permeability of the phreatic layer:

    Study of the soil permeability.

    Flow lines visualization.

    Calculation of the equipotential lines.

    Measurement of the infiltration speed.

    Verification of the Law of Darcy.

17.- Flow through an earth dam:

    Study of the soil permeability.

    Flow lines visualization.

    Calculation of the equipotential lines.

    Pressures distribution.

    Effects of the layer inclination.

REQUIRED SERVICES

- Electrical supply: single-phase 200 VAC – 240 VAC/50 Hz or 110 VAC – 127 VAC/60 Hz.
- Water supply and drain.

DIMENSIONS AND WEIGHTS

PDFD:

    - Dimensions: 1500 x 700 x 2000 mm approx.

                  (59.05 x 27.55 x 78.73 inches approx.)

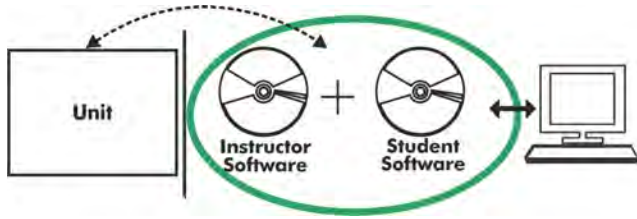   - Weight: 150 Kg approx.

                  (330 pounds approx.)

REQUIRED CONSUMABLES (Not included)

- Sand. (For filling of the soils container).

SIMILAR UNITS AVAILABLE

<u>Offered in this catalogue:</u>

- PDFD. Drainage and Seepage Tank.

<u>Offered in other catalogue:</u>

- PDFDC. Computer Controlled Drainage and Seepage Tank.

PDFD/ICAI. Interactive Computer Aided Instruction Software:

With no physical connection between unit and computer, **this complete software package consists of an Instructor Software (EDIBON Classroom Manager -ECM-SOF) totally integrated with the Student Software (EDIBON Student Labsoft -ESL-SOF).** Both are interconnected so that the teacher knows at any moment what is the theoretical and practical knowledge of the students.
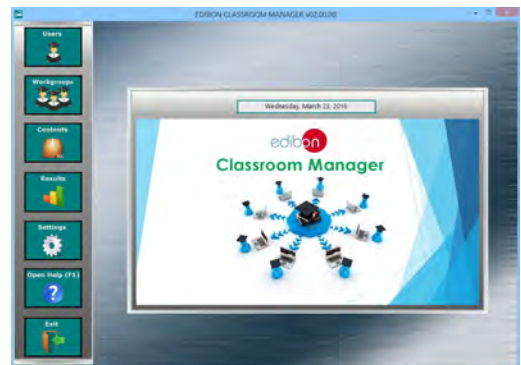
Instructor Software

### - ECM-SOF. EDIBON Classroom Manager (Instructor Software).

ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual students, workgroups, units, etc... so the teacher can know in real time the level of understanding of any student in the classroom.

Innovative features:

• User Data Base Management.

• Administration and assignment of Workgroup, Task and Training sessions.

• Creation and Integration of Practical Exercises and Multimedia Resources.

• Custom Design of Evaluation Methods.

• Creation and assignment of Formulas & Equations.

• Equation System Solver Engine.

• Updatable Contents.

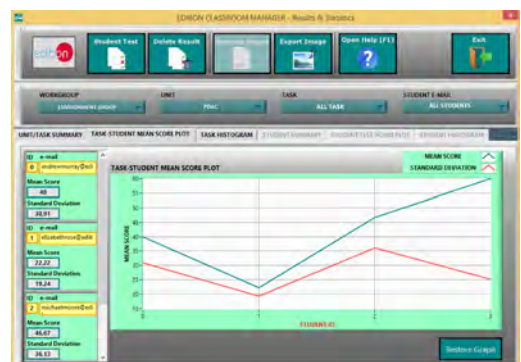• Report generation, User Progression Monitoring and Statistics.

ECM-SOF. EDIBON Classroom Manager (Instructor Software) Application Main Screen
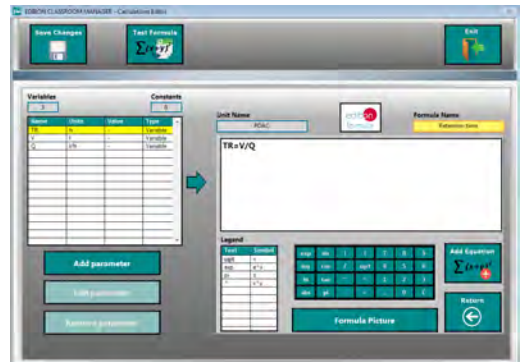
ECAL. EDIBON Calculations Program Package - Formula Editor Screen
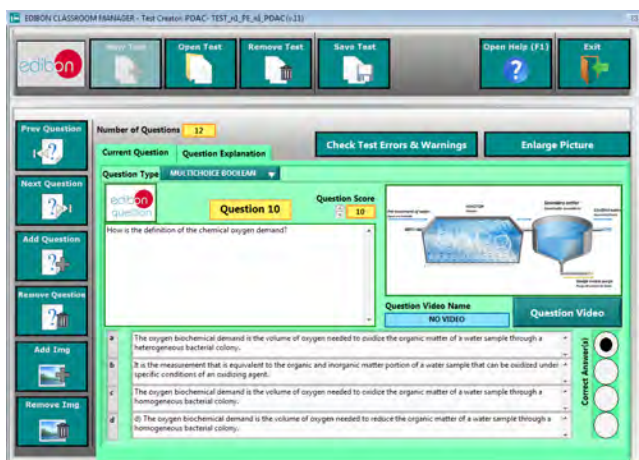
ETTE. EDIBON Training Test & Exam Program Package - Main Screen with Numeric Result Question

ERS. EDIBON Results & Statistics Program Package - Student Scores Histogram

- ESL-SOF. EDIBON Student Labsoft (Student Software).

ESL-SOF is the application addressed to the Students that helps them to understand theoretical concepts by means of practical exercises and to prove their knowledge and progression by performing tests and calculations in addition to Multimedia Resources. Default planned tasks and an Open workgroup are provided by EDIBON to allow the students start working from the first session. Reports and statistics are available to know their progression at any time, as well as explanations for every exercise to reinforce the theoretically acquired technical knowledge.

Innovative features:

• **Student Log-In & Self-Registration.**

• **Existing Tasks checking & Monitoring.**

• **Default contents & scheduled tasks available to be used from the first session.**

• **Practical Exercises accomplishment by following the Manual provided by EDIBON.**

• **Evaluation Methods to prove your knowledge and progression.**

• **Test self-correction.**

• **Calculations computing and plotting.**

• **Equation System Solver Engine.**

• **User Monitoring Learning & Printable Reports.**

• **Multimedia-Supported auxiliary resources.**

For more information see **ICAI** catalogue. Click on the following link:
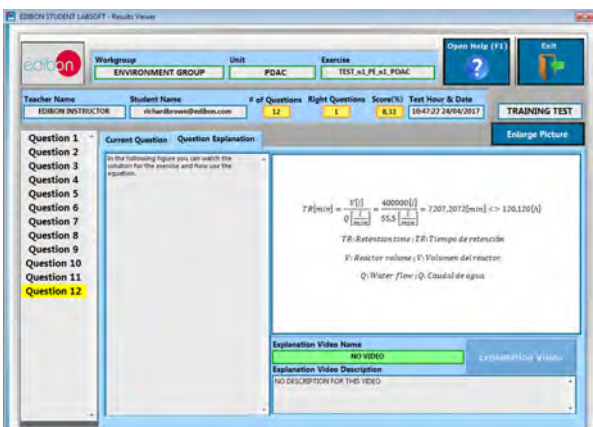
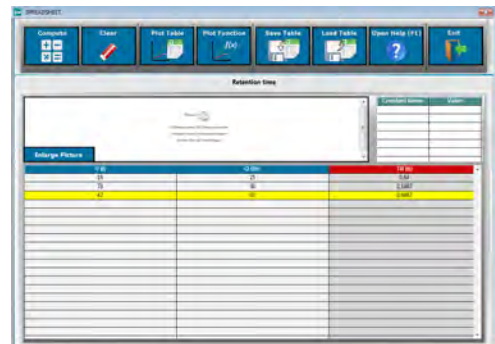www.edibon.com/en/files/expansion/ICAI/catalog

ESL-SOF. EDIBON Student LabSoft (Student Software)
Application Main Screen

EPE. EDIBON Practical Exercise Program Package Main Screen

ERS. EDIBON Results & Statistics Program Package - Question Explanation

ECAL. EDIBON Calculations Program Package Main Screen

✱ Specifications subject to change without previous notice, due to the convenience of improvement of the product.

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INTERNATIONAL

C/ Julio Cervera, 10-12-14. Móstoles Tecnológico.
28935 MÓSTOLES. (Madrid). ESPAÑA - SPAIN.
Tel.: 34-91-6199363   Fax: 34-91-6198647
E-mail: edibon@edibon.com   Web: **www.edibon.com**

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