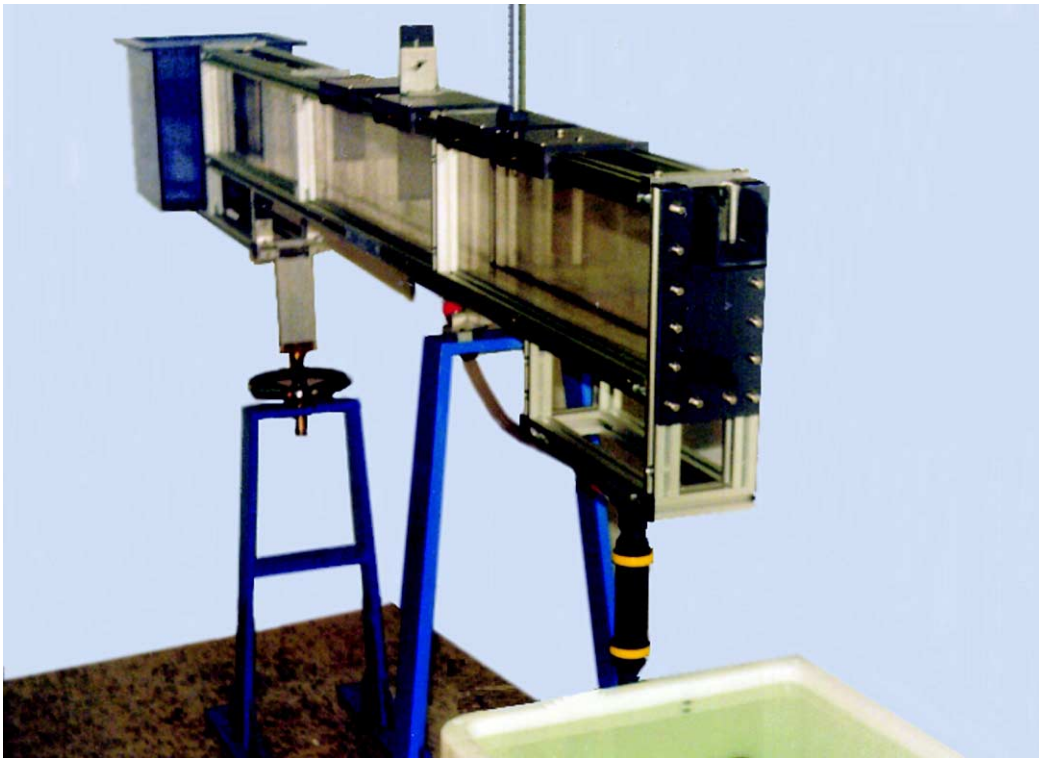


Some available accessories



www.edibon.com
 ↳ Products
 ↳ Products range
 ↳ Units
 ↳ 8.-Fluid Mechanics & Aerodynamics

DESCRIPTION

The EDIBON Sediment Transport Demonstration Channel "CAS" allows demonstration of the full range of bedforms that arise in a mobile bed as the slope and / or flow are increased.

This unit can play a useful role in any course concerning the mechanics of open channel flow and sediment transport.

The unit consist of an inclinable channel mounted on a base plate, supported by two supports, with a discharge tank and recirculating pump. This tank is in the hydraulic feed system (FME00/B) that contains a recirculating pump.

The channel sides are transparent allowing the observation of bed profile changes, and a section of one side is provided with graphical grid markings to permit quantitative assessments to be made of bedform dynamics.

A water level gauge is included to measure the head over the channel discharge weir and therefore to deduce flow rates from a calibration chart.

For demonstrating scour effects of structures on rivers beds, solids models, as an adjustable undershot weir and bridge pier are supplied.

To start a demonstration, sand is placed along the channel bed, between the inlet tank and the overfall discharge weir. Water is circulated around the system at one of the flow rates. The slope of the channel is adjustable.



ISO:9001-2000 Certificate of Approval. Reg. No. E204034



European Union Certificate



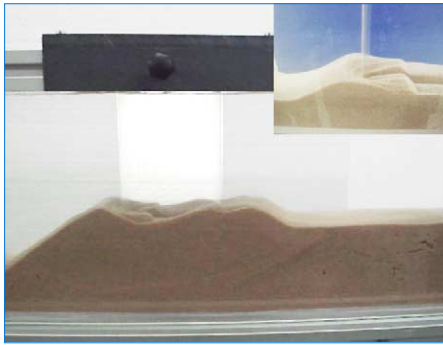
Certificates ISO 14001: 2004 and ECO-Management and Audit Scheme (environmental management)



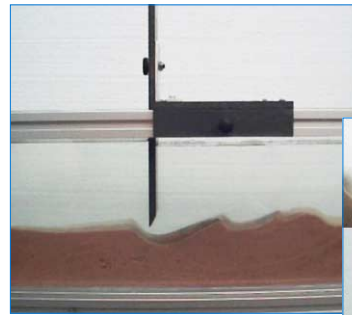
Worlddidac Quality Charter Certificate Worlddidac Member



CFRM. Level gauge for measurement of the water height (hook and point gauges)



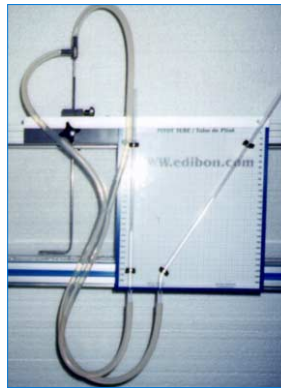
CFPS. Single bridge pier



CFPR. Adjustable undershot weir



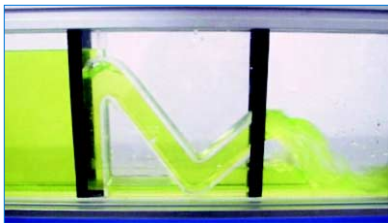
CFDA. Sand Distributor



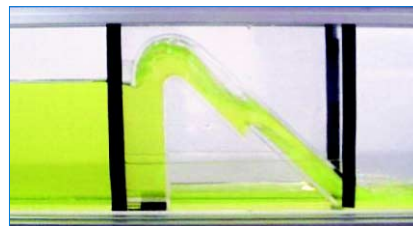
CFTP. Pitot tube and manometer board



CFVDG. Broad and thin crested weirs



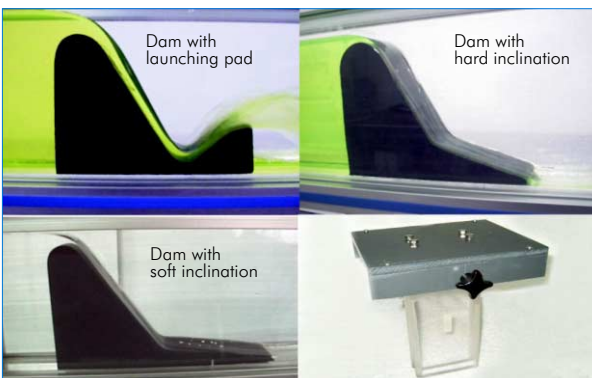
CFSDL. Syphon spillway



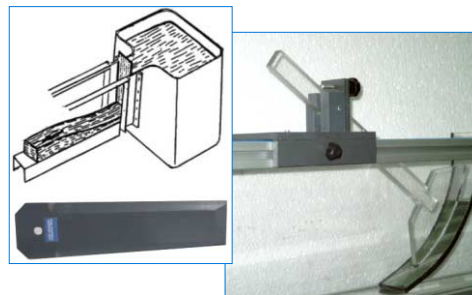
CFSDS. Air regulated syphon



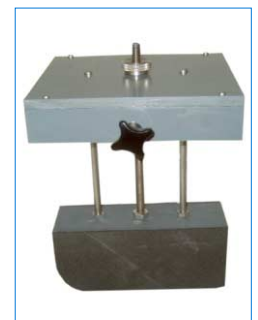
CFVC. Crump weir



CFPVP. Dams spillway and flow splitters (3 different models of dams)



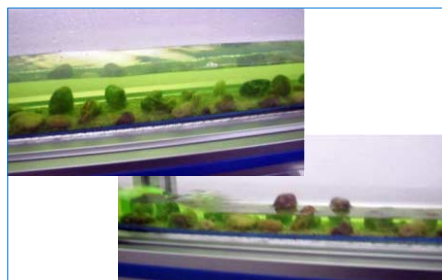
CFCVR. Vertical flat gate and radial gate



CFCA. Culvert fitting



CFVEN. Venturi flume

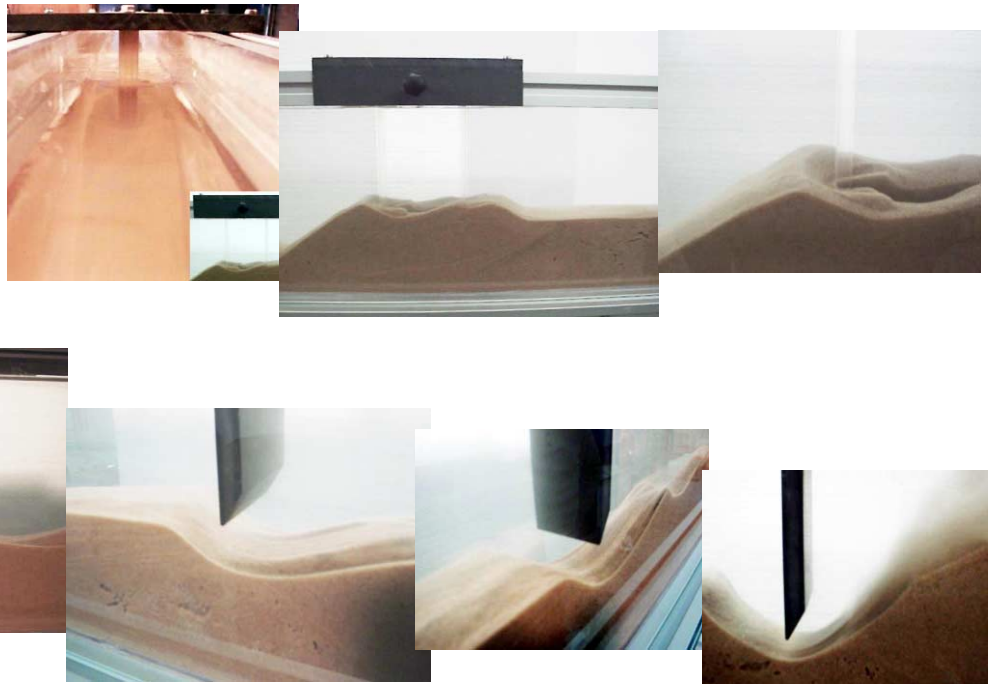


CFPLR. Artificial roughened bed (3 different models)



CFFS. False floor sections

Detail of some bedforms and effects on beds of different structures



SPECIFICATIONS

Transparent, inclinable flow channel through which water can be recirculated by a pump over a mobile bed to demonstrate the whole range of bed forms from incipient particle movement to bed wash-out.

Anodized aluminium structure and supports in painted steel.

Main metallic elements in stainless steel.

Channel of rectangular section with transparent walls, formed by folded methacrylate transparent pieces.

The channel is assembled on two supports, with a system to control the inclination of the channel. Channel slope: adjustable between 0% and +10%.

Channel section: 80mm, length: 2.5 m.

The unit is self-contained and it can be installed with easiness, and it has a complete range of profiles.

Inlet tank (capacity: 38 litres), with stilling of flow and with drain valve.

Pipes. Diaphragm flow meter.

Sediment filter in tank and inlet section.

Manometric tubes panel. It is formed by two methacrylate tubes of 500 mm. of length, with a graduated panel. Hand pump.

The grain diameter of the sediment oscillates among 0.1 to 0.3 mm.

Accessories included:

CFRM. Level gauge for measurement of the water height (hook and point gauges), to calibrate the overshoot weir.

CFDA. Sand distributor.

CFPR. Adjustable undershot weir.

CFPS. Single bridge pier.

CFCV. Vertical flat weir.

The speed of discharge can be selected by means of the valve that is placed in the Basic Hydraulic Feed System (FME00/B).

Basic Hydraulic Feed System (FME00/B):

Centrifugal pump: 0.37 KW, 30 - 80 l/min at 20.1 - 12.8m., single-phase 220V. / 50Hz. or 110V. / 60Hz.

Stainless steel impeller.

Tank capacity: 140 litres approx.

Flowmeter.

Membrane type flow adjusting valve.

Pump breaker starting.

Safety differential switch.

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.**

Optional accessories:

CFTP. Pitot tube and manometer board.

CFVDG. Broad and thin crested weirs. (One broad weir and 2 thin weirs)

CFCVR. Vertical flat gate and radial gate.

CFSDL. Syphon spillway.

CFPVP. Dams spillway (3 different models) and flow splitters.

CFCA. Culvert fitting.

CFVC. Crump weir.

CFVEN. Venturi flume.

CFSDS. Air regulated syphon.

CFFS. False floor sections.

CFPLR. Artificial roughened bed (3 different models).

Some practical possibilities of the Unit:

Flow over a mobile sand-bed

(bedforms associated with increasing flow intensity and sediment transport rate)

- 1.- Lower Regime (bedforms exhibited):
 - Plane- bed (no motion).
 - Ripples and dunes.
 - Washed- out dunes.
 - Ripples.
 - Dunes.
- 2.- Upper Regime (bedforms exhibited):
 - Plane- bed (with motion).
 - Chutes and pools.
 - Anti- dunes.
 - Breaking anti- dunes.
 - Standing waves.

Flow over fixed, gravel-bed

- 3.- Although the channel can not transport gravel, this can be used to investigate flow resistance in gravel and polder- bed rivers.
- 4.- We can calculate the flow resistance coefficients, using equations such as those of Bray, Limerinos, Hey, Lacey, Thompson and Campbell and Bathurst and the results compared to the actual values obtained by observation.

Flow structures

- 5.- We can examine the structure of turbulence in the flow, using dye injection, interesting for the dune bedform configuration and clearly demonstrates separation on the lee face.

Fixed, smooth bed flow:

(the channel may be used without sediment on the bed to demonstrate several flow phenomena and equations)

- 6.- Rapid, super- critical flow- dominance of inertial over gravity forces, shock waves from flow obstructions.
- 7.- Turbulence.
- 8.- Governing equations of open channel flow-Reynold's number, Froude number, continuity, Bernoulli's equation, weir equations.
- 9.- Tranquil, sub-critical flow- movement of surface waves upstream against flow.
- 10.-Hydraulic jump- transition from super to sub critical flow, air entrainment, mixing.
- 11.-Flow measurement- using sharp crested weirs.

Bedform hysteresis

- 12.-If the discharge in the channel changes quickly, there is no

sufficient time for bedforms to adjust to the new flow regime. Hence, if a flood hydrograph is simulated by increasing and then decreasing the discharge, different depths will occur for the same discharge on the rising and falling limbs.

Data collection and numerical evaluation(computational work)

- 13.-In addition to illustrating flow and sediment phenomena, we can use the channel for basic data collection and numerical evaluation of the following:
 - Flow resistance:
 - Manning, Chezy and Darcy-Weisbach friction factors for several bedform configuration.
 - Bedform prediction:
 - Velocity-Hjulstrom diagram.
 - Suspended load-movement by suspension.
 - Shields parameter-Bogardi diagram.
 - Stream power-Simons and Richardson charts.
 - Boundary shear stress-Leeder chart.
 - Initiation of motion:
 - Shields diagram.
 - Hjulstrom's curve.

Mechanics of sediment transport

- 14.-We can observe the movement of grains, starting from a plane-bed with no motion, on the following:
 - Initiation of motion.
 - Trajectory of initial motion.
 - Movement by rolling and sliding (contact load).
 - Movement by hopping (saltation load).
 - Movement by suspension.

Depositionary features and facies

- 15.-We can observe the deposition of sediment load and the resulting patterns of grains within the sand body may be identified.

Local scour

- 16.-Scour under boils and vortices in the flow is observed under both the lower and upper regime bedforms. Obstructions may be introduced to represent bridge piers, sills, revetments, etc, and the resulting pattern of scour examined.

Other possible practices:

- 17.-Behaviour study of the connection to the drain of a channel with sediment.
- 18.-Turbulence study by means coloration.
- 19.-Calculation of water flow.

REQUIRED SERVICES

Electrical supply: single- phase, 220V./ 50Hz or 110V./60Hz.
Water supply and drainage.
Sand and gravel.

DIMENSIONS & WEIGHT

Dimensions: 3600 x 1000 x 1700mm approx.
Weight: 250 kg approx.

OPTIONAL ACCESSORIES

- | | |
|--|---|
| CFTP. Pitot tube and manometer board. | CFVC. Crump weir. |
| CFVDG. Broad and thin crested weirs. (One broad weir and 2 thin weirs) | CFVEN. Venturi flume. |
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| CFCA. Culvert fitting. | |

*Specifications subject to change without previous notice, due to the convenience of improvements of the product.



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REPRESENTATIVE:

