



In order to calculate the secondary **load losses produced by the fittings of an installation**, we take data of the difference of pressures between the gauges upstream and downstream of the element to be measured, in addition, we must subtract the existing primary load losses due to the straight sections of a pipe.

When we want to obtain the **pressure loss that occurs between two pressure ports located in pipes of different diameter**, we must take into account that not all the difference of static pressures read corresponds to losses of load, that part is due to the transformation of static pressure in dynamic pressure by the increase of the speed.

The equipment has **all possible configurations of 90 ° elbows**, in addition to widening and abrupt narrowing, and a gate valve. These load losses are read simultaneously by means of a water column multimanometer, which allows to **visualize with maximum clarity the difference between the different types of bends**, and additionally, of widening and narrowing, and valve.

In addition, the equipment has an **electronic differential pressure gauge**, which allows the measurement with a greater range, of the pressure loss produced in the gate valve with different openings.

The flow measurements are carried out by means of the volumetric tank of the hydraulic bench (required), with which the relationship between the losses and the speed of the fluid is also studied.

**LEARNING OBJECTIVES**

The objectives that are intended to be achieved with the design of this didactic equipment are the following:

- Checking the relationship between load losses and fluid velocity in the pipe.
- Measurement and verification of the secondary losses of load that occur in elements of installations, such as:
  - Elbows of 90°
  - Curves of 90°
  - Long curve of 90°
  - Elbows of 45°
  - Abrupt narrowing
  - Abrupt widening
  - Gate valve
- Calculation of the loss coefficients "K" corresponding to each of the elements mentioned above.
- Use of different types of manometers:
  - Water column
  - Electronic differential

**TECHNICAL DATA****Pipe diameters:**

- Main pipe:  
 $\text{Ø}_{\text{interior}} = 21,2 \text{ mm. ; } \text{Ø}_{\text{exterior}} = 25 \text{ mm.}$
- Abrupt Narrowing/Widening:  
 $\text{Ø}_{\text{interior}} = 27,2 \text{ mm. ; } \text{Ø}_{\text{exterior}} = 32 \text{ mm.}$

**Components to study:**

- Long curve 90°
- Abrupt narrowing
- Abrupt widening
- Usual elbow 90°
- Short curve 90°
- Gate valve
- Straight elbow 90°

**Manometers:**

- Water column multimanometer of 12 tubes and 440 mm
- Electronic differential manometer

**Additional characteristics:**

- The equipment has a hand pump for adjusting the reading height on the multi-tube manometer.

**REQUIREMENTS:**

- DIKOIN hydraulic bench.