Dear Dr. Vincenzo Capasso
Sole Director
ECOLcap S.R.L.
Corso Vittorio Emanuele, 115
80034 Marigliano (Napoli)

Napoli, 13-10-2003

Object: "VigorFluss" technology system for water and energy saving.

Ref. Your request of 6/10/2003.

Dear Dr. Capasso,

We have examined the documentation annexed to Yours in Ref; the topic is interesting because it is part of the technologies aimed to reduce water and energy consumption and therefore compatible with environmental protection.

In order to verify the real potential of the proposed systems, a series of experimental tests were carried out in the Laboratory of Fluid Dynamics and Combustion of the Istituto Motori. In particular, the following two devices were tested:

1. Device art. AUV001-2

2. Device art. VV-M A-A001

First It was checked the operating principle of both devices and then they were compared the water and energy consumption with conventional systems currently on the market.

Lastly, durability tests were conducted to verify their ability to drastically reduce limescale deposits.

The results of the tests are annexed.

Dott.Ing. Felice Espsosito Corcione

Head of the fluid-dynamics and combustion laboratory

Device art. AUV001-2

The AUV001-2 device, shown in figure 1, is made up of a cylindrical brass chromed wrap (1) with a resin valve repellent limestone acetal "Delrin" inside (2) with the first conical shaped section for the anchorage to a stainless steel spring (3).
The device was applied to the water supply pipe of water delivery system with variable pressure.
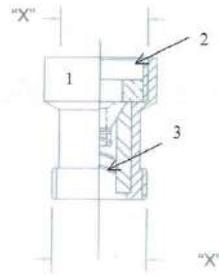

Figure 1. Device AUV001-2

During the tests, the measurement of the flow rate, varying the pressure of the fluid, was performed using a "Venturi" meter placed in a horizontal position as shown in the diagram in figure 2.
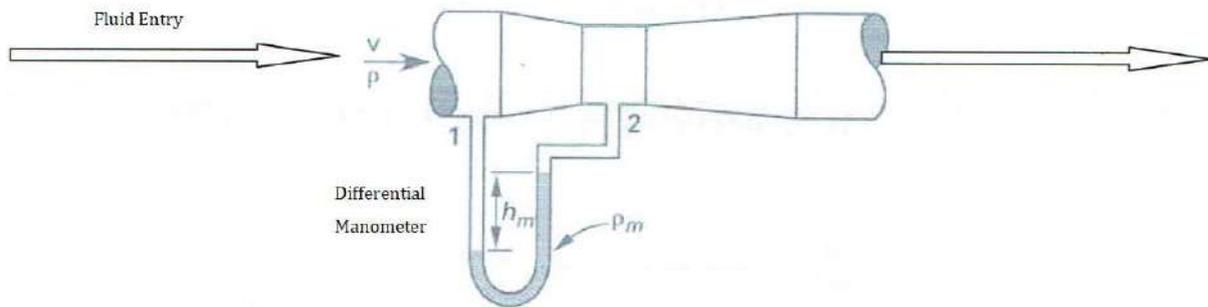

Figure 2. "Venturi" flow meter used during the tests

The calculation of the flow rate Q was carried out using the equation shown below which is based on the measurement of pressure to the differential between upstream and in the restricted area of the venturi. The efflux coefficient Cd was assumed to be 0.98.

$$Q = \left[\frac{C_v A_2}{\sqrt{1 - \left(\frac{A_2}{A_1}\right)^2}} \right] \sqrt{2g \left(\frac{p_1}{\gamma} + z_1 - \frac{p_2}{\gamma} - z_2 \right)}$$

The variable pressure delivery tests showed a low dependence of the flow rate from the pressure as shown in Figure 3. This important result suggests that the device allows a reduction in consumption of the fluid dispensed without penalizing the result of use.
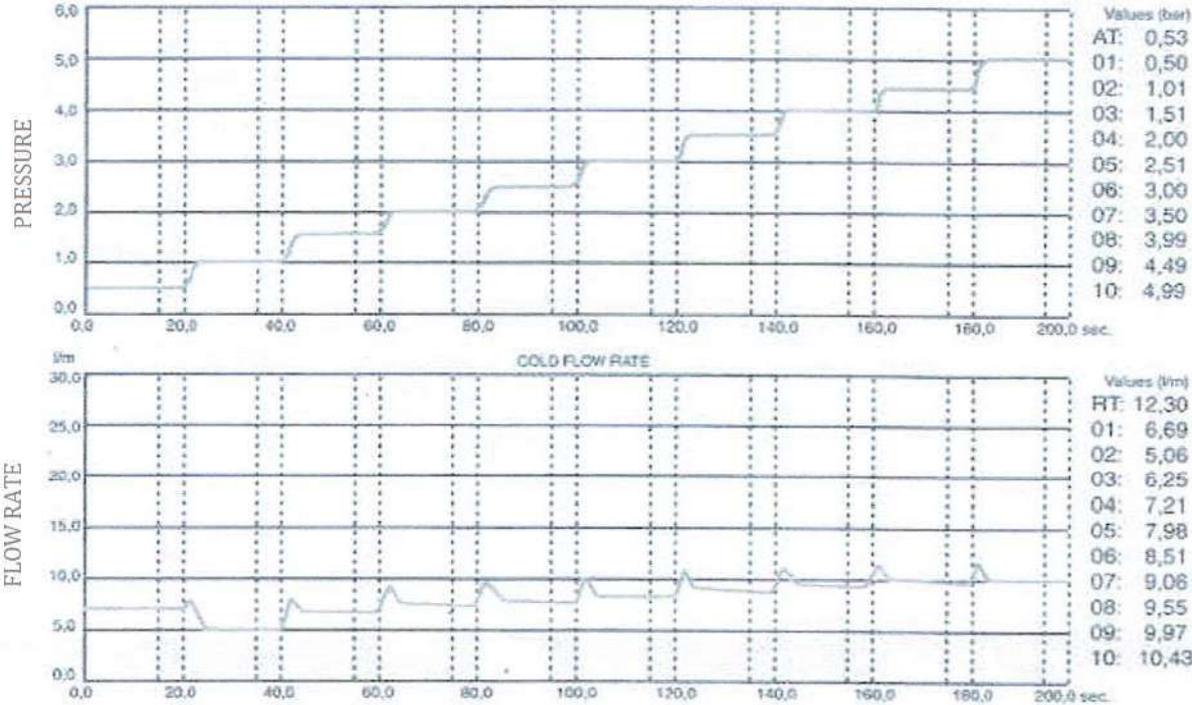

Figure 3. Trend of the pressure and flow rate according to the time of use

Device art.VV-MA-A001

The device art.VV-MA-A001, shown in Figure 4 A-B, is made up of three bodies assembled in "Delrin" repellent limestone acetal resin. The assembled device (see figure 4 A) has been applied to the locking ring of the water supply system (tap) replacing the conventional metallic flow regulator.

It has been verified that the water entering from the 3mm hole dissipates part of the kinetic energy in a dissipating chamber and then, continuing towards the exit, creates a depression in the upper part of the valve trapping air with consequent excellent mixing of the water with air. This behavior of the flow regulator valve is at the basis of the reduction of the specific flow rate observed during the tests. The results of the tests showed that the water flow rate, measured with the venturi meter previously described, at the same time and temperature of use, is reduced by 35% and the consequent energy saving is 22% compared to the systems currently used.

Figure 4. A-B Drawing of the device VV-MA-A001

Duration tests

For both devices, durability tests were carried out for a total of 480 hours of continuous operation. The results of the investigations have shown that the AUV001-2 and VV-MA-A001 devices do not show any limestone deposits as they have been found on conventional steel net delivery systems.