

## 1.1 Definition and Functionality

The piston hydro pneumatic accumulator, is a component used to exchange energy using the hydraulic system to which it is connected. It escapes energy at determined moments, the accumulate in the form of pressure energy of gas, it readily and integrally replenishes the system on demand, returning to the conditions of receiving again.

The piston accumulator is particularly constructed with two chambers, one of which is filled with gas at opportune pressure, and the second one connected to the hydraulic circuit.

The gas pressure must be chosen in relation to the conditions of work of the accumulator, and constitutes the pre-loading pressure.

## 1.2 Constructive Characteristics

The piston accumulator consists of a steel cylinder, closed at both ends, in which slide an airtight aluminium piston.

This divides the internal of the cylinder in two chambers, one filled with pre-charge gas and the other with oil, or generally speaking, with fluid from the system (Fig 1).

- **The piston** is made from aluminium in order to have rapid response time and not to generate pressure peaks during rapid cycles. It also has a cavity in order to lighten it, visible in fig 1. facing the gas chamber, in order to increase the volume of accumulate. Even the surface in contact with the oil has a concave cavity. The purpose of this cavity is so that the oil pressure acts on almost the entire surface of the piston and not only in one spot when the piston is against the bottom end cover in the oil chamber

- **Seal between piston and cylinder** is guaranteed by a special multi ring seal, which constitutes the key characteristic elements to the efficiency of the accumulator. This type of seal has allowed the piston accumulator to have essential characteristics regarding air lightness, component longevity and stroking. In fact, the differential pressure necessary to move the piston, that relates directly on the speed of response of the accumulator, is contained in moderate values, contrary as occurs in most seals for standard pistons.

The maximum operating temperature with NBR seals is 80°C.

It is possible to operate at temperatures up to 150°C, using viton seals and reduced piston, as the expansion factors of aluminium and steel are different, it is therefore necessary to compensate the thermo effect.

In piston accumulators, the duration and number of operations effected without evidence of variation in pressure in excess of 5% in the value off the pre-charge surcomes without penetration, above a certain quantities of oil in the gas chamber.

It is usually preferable to assume the variation of pre-charge as a valuation of the longevity of the accumulator as long as this check is carried out fast and simply.

Through practical results, obtained from application experience, as well as laboratory test, it was proved that 1.000.000 operations can be achieved without maintenance or intervention of recharging.

- **The cylinder body of the accumulator** is made from low carbon steel, equivalent to mechanical characteristics of 97/23/CE. The internal surface of the cylinder is honed to 0.2 micron of roughness.

For particular reasons, the cylinder and end covers can either be superficially treatment or made from stainless steel.

- **The gas side** end cover is screwed to the cylinder body, the seal is guaranteed by a toroidal gasket, complete with anti-extrusion ring. In the standard version this end cap has a threaded seat in which the pre-charged valve is situated.

- **The oil side** end cover is also screwed to the cylinder body and is complete with relative seal. This end cap has a coupling to connect it to the system, either threaded or flanged, in accordance to the clients requirements.

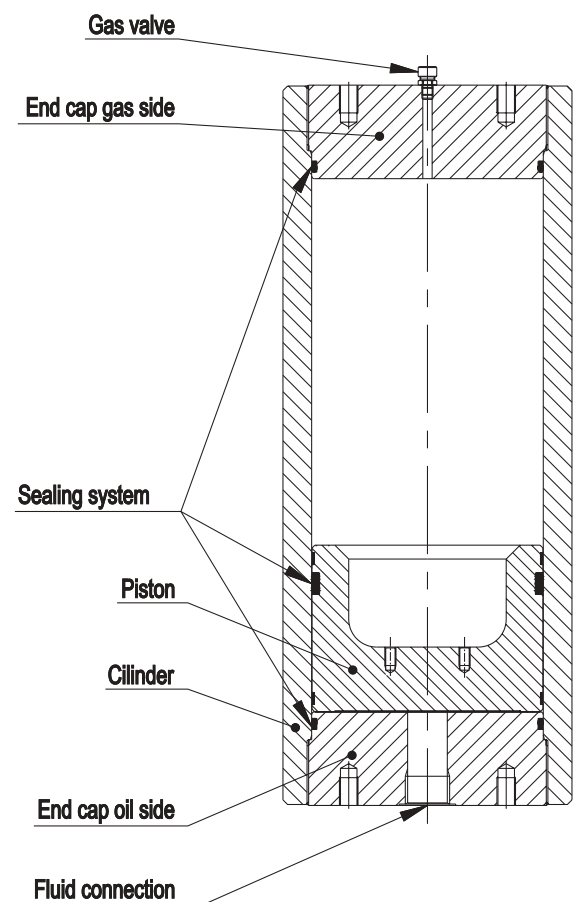


Fig. 1

- All the production of EPE accumulators is integrally tested to PED standards.

The accumulators are tested at PT pressure which is equal to maximum working pressure PS, multiplied by 1,43 which allows to verify the absence of defects, capable of causing flaws and deformities in the cylinder and piston, or gas or oil leak from the seals, threaded sections or valve.

The relieve pressure is in excess of 1 700 bar for model types, designed to work at a maximum pressure of 375 bar.