

Various industrial processes require the feeding of a product to a pressurised chamber or vessel. Currently so-called 'load locks' are applied which use external gas sources to increase the pressure in the lock to prevent products from the pressure chamber to escape when the feeding takes place. Typically these processes involve pressures over 50 bar and temperatures over 200°C. ECN has developed a Feed Valve, able to pump fluids, solids, gasses and mixtures to a pressurised chamber without dead volume. This eliminates the need for expensive backing gas installations or flushing. Accurate dosing is possible without the risk that materials remain inside the valve and thus return to the inlet side.

Key words: Load-lock, valves, pumping, fluids, solids, gasses, feeding, biomass, engineering, high pressure

Description

- ECN has developed a cost effective Feed Valve that enables the continuous feeding of a product to a pressure chamber without disturbance of the process atmosphere.

New and innovative aspects

- Loading a pressurised process installation under process conditions;
- No supporting or flushing gas required;
- Continuous process;
- Concept scalable to all dimensions valves;
- No dead volume in the return to inlet so no contamination, no pressure relief.

Main advantages of its use

- No need for supporting or flushing gas, eliminating expensive support gas installations (CAPEX of several million euros are not uncommon);
- Simple concept that will fit within the dimensions of standard valve systems;
- No disturbance of the process when loading or pumping takes place;
- No dead volume so no risk to loose product or evaporate on the inlet side;
- Fail safe due to the mechanical principle;
- No leak of process atmosphere back to the inlet;
- Only one valve required instead of 2 for the same function;
- High pressure loading possible;
- Various function possible, pumping, loading/unloading, dosing;
- Various materials can be handled, bulk goods, fluids and gasses.

Specifications

- The Feed Valve will receive dimensions similar to the standard commercially available valve systems. This makes incorporation simple;
- Can be designed according to PED;
- Pressures > 50 bar(g);
- Temperatures > 200°C;
- Dimensions in principle possible from DN25 up to DN400.



Figure: Feed Valve prototype (at bench scale) on the side: inside ball valve and below pellets as test product

Potential applications

- Feed Valve for coal in coal degassing process;
- Pumping solids in a pressurised atmosphere;
- Pumping toxic or hazardous fluids or solids;
- Dosing in a pressurised atmosphere.

State of development

- Prototype has been built and tested and available at ECN. The first tests have proven the principle. See the above pictures for an impression;
- Further developments required based upon application.

Transaction type and partner profile

- License contract;
- ECN is looking for a partner to further develop, industrialise and commercialise this product.

Intellectual property

- Priority date: 11-07-2012;
- Patented granted in the Netherlands, other applications currently pending.