7.3.5.13 Metal bellows seal

Stem sealing constructions utilizing a metal bellows seal, guarantee, unlike conventional stuffing boxes, a maintenance-free service and the retention of the specified tightness. However to ensure a life time of approx. 200,000 full stroke cycles - which corresponds normally to a non-interrupted service of several years - most control valves have to be improved in important details. As a rule of thumb, the length of a bellows seal should be approximately ten times the nominal stroke of the control valve. Only such a design ensures an adequate service life.

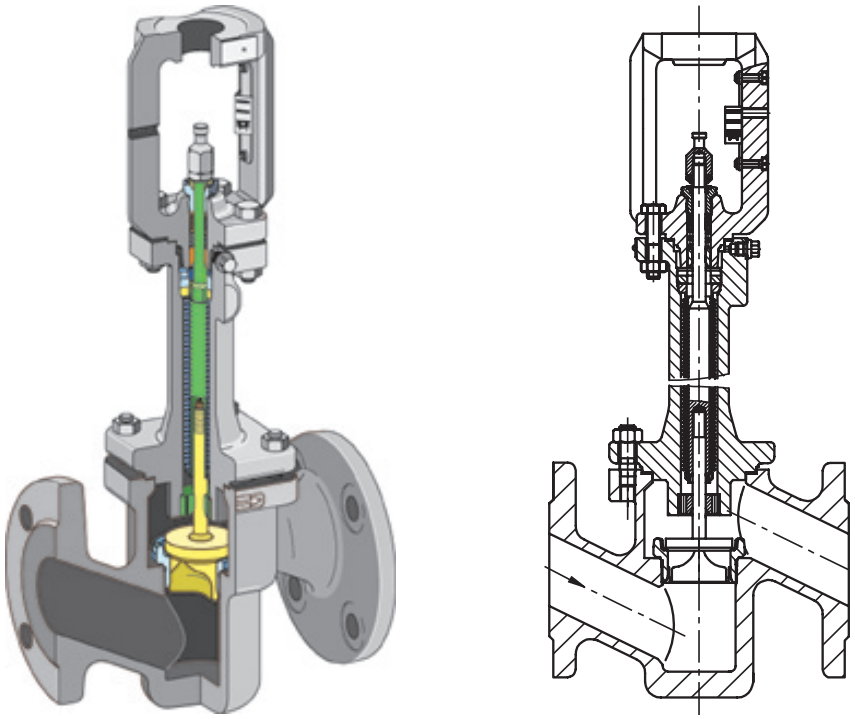

Figure 7.3.5.13.-1: Type 3241 with metal bellows seal and with body material forged steel.

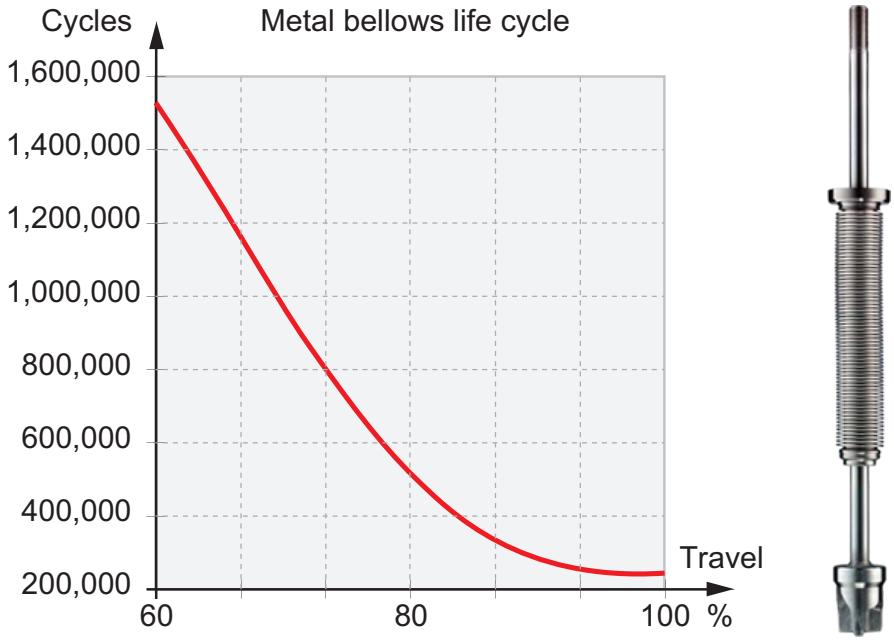

Figure 7.3.5.13.-2: Life cycle time for SAMSON metal bellows seal.

The bellows seal design seems to have been forgotten in international discussions and published papers, but it is still unbeatable concerning its life cycle and tightness quality. In the “world of valves” under the requirements of fugitive emissions approximately 5 % are control valves..

This means about 95 % valves are on-off devices like gate, cock or ball valves. Most often, they remain static in the open or closed position. Only a very small share of them are cycling or part of a dynamic process. For the majority of on-off valves that are equipped with bellows seal, the bellows are designed only for some thousands – average 10,000-cycles.

Control valves can be components of high dynamic processes as well as in the case of most valves controlling to a set point, they move around the operating point, meaning the valve stroke moves just within < 20 % of the total travel. Very occasionally they “sleep”.

Here certified fugitive emission packing material and design is sophisticated, but because of the small production volume, expensive. Furthermore, the material loses its predicted life cycle time in hazardous environments, i.e. its sealing quality.

Attacks from within the valve, e.g. fluids that contain glue or have diffusing qualities, and from the outside of the valve such as heavy dust or sand, are risks which are much less critical when a bellows seal is used. SAMSON bellows seal, unbeatable in life cycle time and tightness quality.