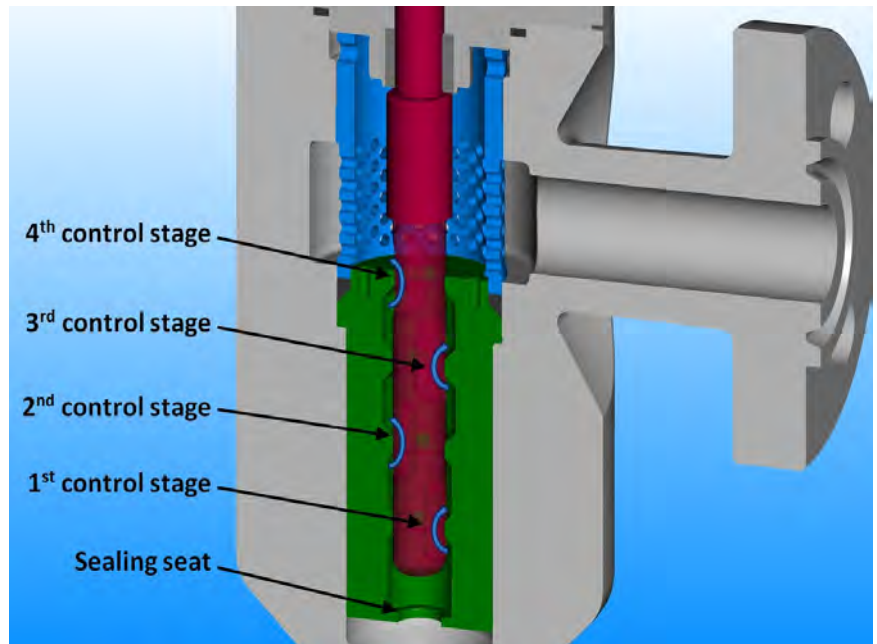


Processes based on the reaction of a process fluid under high pressure and at a high reaction temperature (possibly with the addition of a catalyst), are of major significance in the chemical and petrochemical process industry. If these are continuous processes, they are quite often in conjunction with a pressure or level control and therefore also equipped with the associated control valves, which transfer the process fluid from the reaction container to the downstream process.



Due to the high pressure drop at these control valves, multi-stage valves are essential for this use; but as soon as particles (e.g. catalysts) are present in the process fluid, not only the normal design (number of individual throttle stages and their respective flow coefficient), but also the grain size distribution of the solids need to be taken into consideration - the cross-section of each individual flow channel in the valve must be dimensioned and designed in such a way that a maximum-sized grain can pass through this flow channel. As the overall cross-section of the flow channels of each throttle stage is defined by the KV, only the parameters "Number of flow channels" (optimal =1) and "Form of the individual flow channel" (a cross-section as circular as possible is optimal here) remain for optimisation.

The MS4 set, in which a flow channel with a CNC controlled characteristic curve in the form of a ball segment is cut into a multiple guided cylindrical rod for each stage, corresponds to a great extent with this optimal solution.

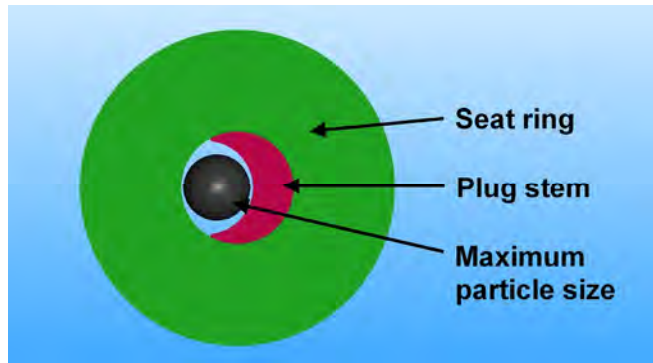
A further special feature of this set is the protection of the sealing edge, which is sensitive to solids, by the overtravel of the valve. This way, the actual control is only enabled when a low pressure drop only occurs at the sealing edge, thus resulting in a slower flow velocity.

MS4

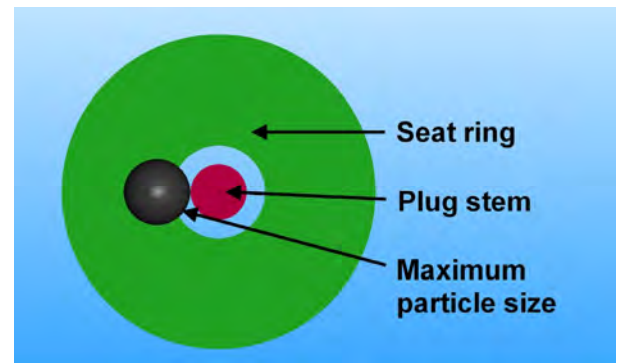
Multi-Stage Trim for Blowdown of Fluids containing Solid Matters



Comparison of MS-Trim cross-section with the double-guided parabolic cone (same KV):

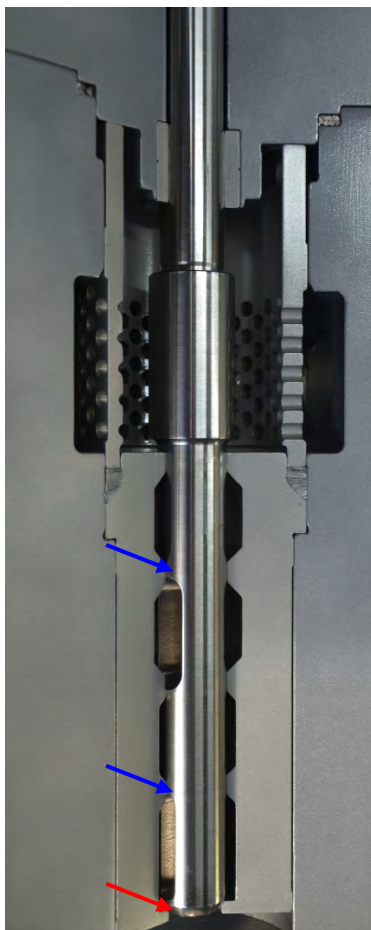


MS Trim



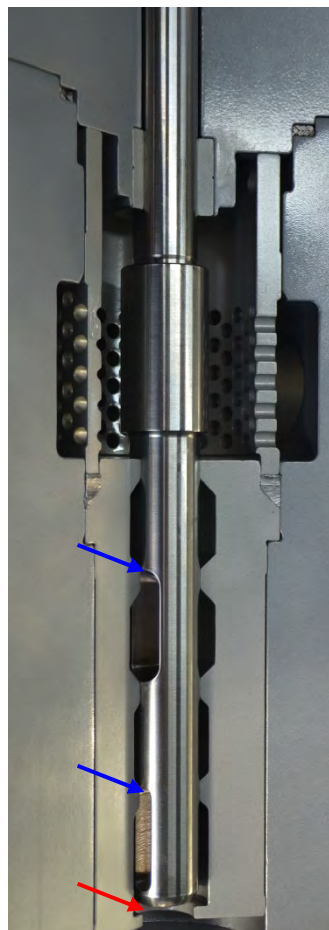
Parabolic cone

Protection of the sealing edges by overtravel:



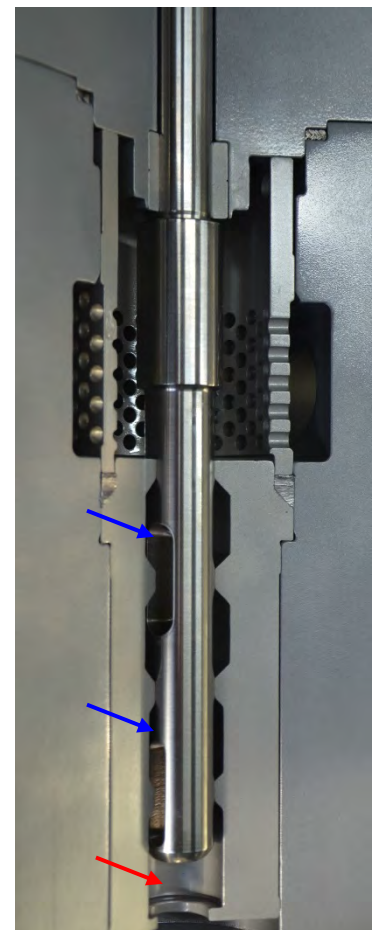
Valve closed

- ▶ Sealing edges in contact
- ▶ Control openings closed



End of overtravel

- ▶ Seat/cone partial opening
- ▶ Control openings start to open



Valve opened

- ▶ Seat/cone full opening
- ▶ Control openings completely opened



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VEREENIGING

Tel: 011 397 2833
Fax: 011 397 4700

DURBAN

Tel: 031 579 2593
Fax: 031 579 2562

South Africa:

0861 103 103

E-mail: sales@valve.co.za

Exports:

africaexports@valve.co.za

www.valve.co.za



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