Comparison and advantages of valves on steam turbines

Nur zur Information / *only for information*

Advantages of the Combination Valve:

emergency stop valve (ESV), control valve (CV)

1. No separate ESV required
2. Compact, space-saving design
3. CV have optimal control quality through the use of tube control valves, especially with small valve strokes
4. Both valve spindles move in the same direction away from the respective valve seat and thus allow the steam to flow in and out freely with low flow losses
5. Optimum flow control enables better flow design. For example, the flow area on the steam strainer is designed according to the amount of steam present at a point and the annular areas from the ESV seat to the CV seat are kept almost constant.
6. This flow guidance results in low overall pressure losses (estimated to be approx. 0.8-1,5 % lower than with ESV+CV single-seat valves)
7. The 90° deflection of the steam flow between inflow and outflow is additionally reduced by the steam sieve used with a 30-45° deflection towards the diffuser, which also further reduces the flow losses
8. Reduced vibrations due to the 45° inflow of the valve spindles and the diffuser with twist-breaking function, which also has a guide for the CV in the end area (small strokes).
9. No steam leaks at valve packings, since the seals of the valves to the atmosphere are switched to the pressureless leakage steam line during operation
10. The valve parts are fastened or guided on the housing cover. This allows easy assembly and disassembly of the valves and their drives by removing the cover.

Source: W. Traupel: Thermische Turbomaschinen, volume 2, page 84, combination ESV+CV

Combination HP quick-closing valve and relieved tube control valve (from approx. 1965) with **2x 90° deflection** are still used today in a similar form, e.g. in power plant turbines.

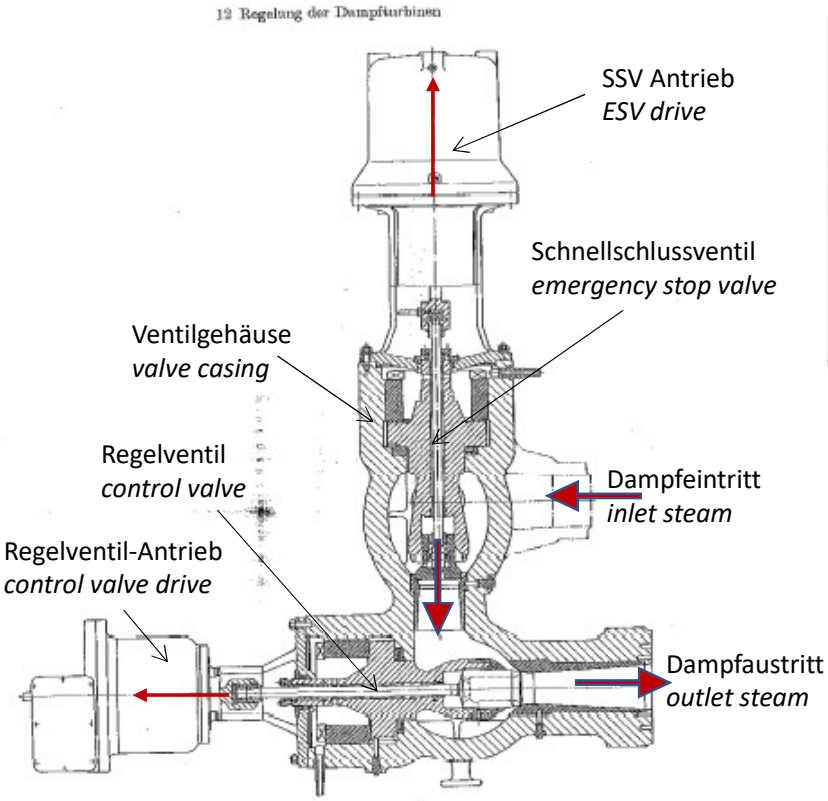

Abb. 12.5.7. Kombination HD-Schnellschluß- und Regelventil, Schnellschlußventil mit Vorhubventil dichtend, Regelventil nicht dichtendes entlastetes Rohrventil (KWU)

New combination valve with 2x 45° deflection of the steam flow between inflow and outflow and an optimized flow control result in lower pressure losses overall (estimated approx. 0.8-1% lower than with the combination HP shown on the right and the single-seat valves currently used).