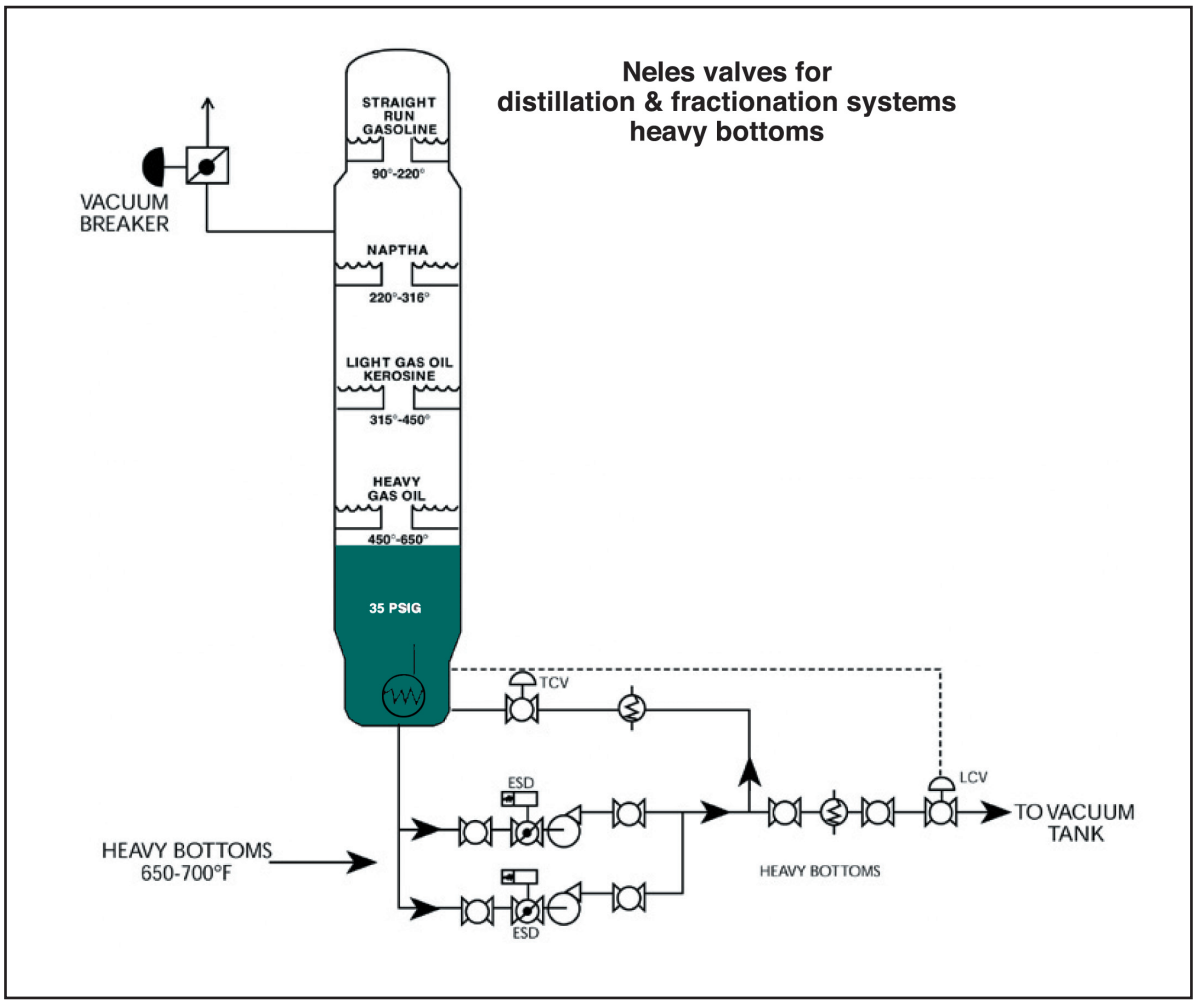
Atmospheric Distillation ESD Valves



Process overview

Atmospheric distillation is the first major process in a refinery. All crude oil entering the refinery, after desalting, passes through the atmospheric distillation column on it's way to further processing in down stream process units. If there is a shut down of the atmospheric distillation column it means that the entire rerfinery is essentially shut down.

Crude oil enters the atmospheric distillation column at 2,4-5,2 bar / 35-75 psig and approximately 370 °C / 700 °F. At this pressure and temperature the fluid is in a liquid/vapor state. In this condition the crude immediately begins to separate upon entering the atmospheric distillation column. Light vapors rise to the top of the column and heavier liquid hydrocarbon fall to the bottom and the separation process begins. Hydrocarbon fractions are drawn from the tower and sent to additional down stream units to be processed into feed stock or blending components.

2721/20/07 EN • 8/2011

ESD valves

The ESD valves are located at the bottom of the atmospheric distillation column and are typically arranged as two valves in parallel piping. The fluid passing through the valves is refered to as heavy bottoms. This fluid is the heaviest cut of a hydrocarbon attainable by atmospheric distillation. The heavy bottoms pass through the ESD valves on their way to the vacuum distillation column for further processing. The ESD valves are used in the normally open condition and are expected to function reliably throughout long process runs, typically four (4) to five (5) years between shut downs.

Process and valve selection considerations include

- ❑ Long process run time – due to very long process run time dependable, predictable valve function is essential.
- ❑ Fluid condition – because the heavy bottoms are delivered to the valves very near to the thermal cracking temperature there is the possibility for some minor coking to occur.
- ❑ Shaft leakage – environmental and safety considerations are factored into ESD decisions. Because the hydrocarbon passing through the valves is at an elevated temperature potential for operator injury and fires is present.

Valve selection considerations

- ❑ Valve size and pressure rating – Depending on the capacity of the atmospheric distillation column the valve size will range from 6” to 12”. Pressure rating will typically be ASME 300 or equivalent.
- ❑ Materials – Valve bodies will typically be A216 WCB carbon steel. In certain installations A217 Gr. C5 chrome moly may be required.
- ❑ Trim – In certain installations standard 300 series stainless may be acceptable. If NACE requirements exist 400 series internals may be required.
- ❑ Seat – The recommended seat arrangement is the “H” metal seat. This seat is up to the task of dealing with the process temperature and pressure and the potential for coking while consistantly providing the required shut off.
- ❑ Actuator – B1J spring return piston installed in the normally open position for fail safe operation.
- ❑ Instrumentation – Neles ValvGuard™, partial stroke testing system, to facilitate a predictive maintenance approach, to allow for real time valve condition monitoring and to insure reliable operation when required.

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