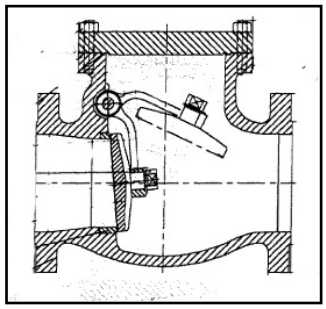
WHY THE NON RETURN VALVE FLUTTERS?

By K.K.PARTHIBAN, Boiler Consultant
Venus Energy Audit System
Email ID:parthi2006@gmail.com / venus.energy@gmail.com

Some of the readers might be experiencing the NRV flap making noise. The NRV makes noise when the flow is inadequate. There are two case studies on this subject, which I would like to present to the benefit of readers.

CASE 1



A client had complained that the non-return valve in steam line at deaerator was fluttering. The irritation made him to call me up. The deaerator pressure control valve was crack open. It meant that there is no sufficient steam flow available for taking care of NRV flap. There is a force required for keeping the flap in lifted condition. Generally we select the line size based on steam pressure & steam temperature. That is, the line selection is based on the steam velocity. The recommended steam line velocity is 30 to 50 m/s. In case the actual steam consumption is so less and the steam velocity is inadequate, then the NRV flap flutters. The way out is to go for reduced line size so that the steam velocity would be sufficient to keep the flap lifted up.

Yet I advised the client to remove the flap as there was no other source of steam supply to deaerator. Since it was a low pressure deaerator with 105 deg C as outlet water temperature, I had suggested this. In case there was a possibility of reversal of steam flow, as in high pressure deaerator, then the non-return valve would be required.

CASE 2

In another case, there were two boilers connected to common header. The boilers were running at part load. The NRV of one boiler kept on fluttering. The reason was again the reduced steam flow. Here the solution can be nothing but changing to smaller steam line size.

THE FUNDAMENTALS

The non return valves do not have much turndown. There is a minimum velocity required to keep the flap up. This is given by an expression,

$V = j \sqrt{v}$,

where j = constant, v = specific volume of the medium. Depending upon the make of the valve, the 'j' value would be different.

Depending on turndown expected, it would be necessary to introduce the reducer and expander. The pressure drop will not be greater than a bigger valve with flap partially open due to lesser flow.
