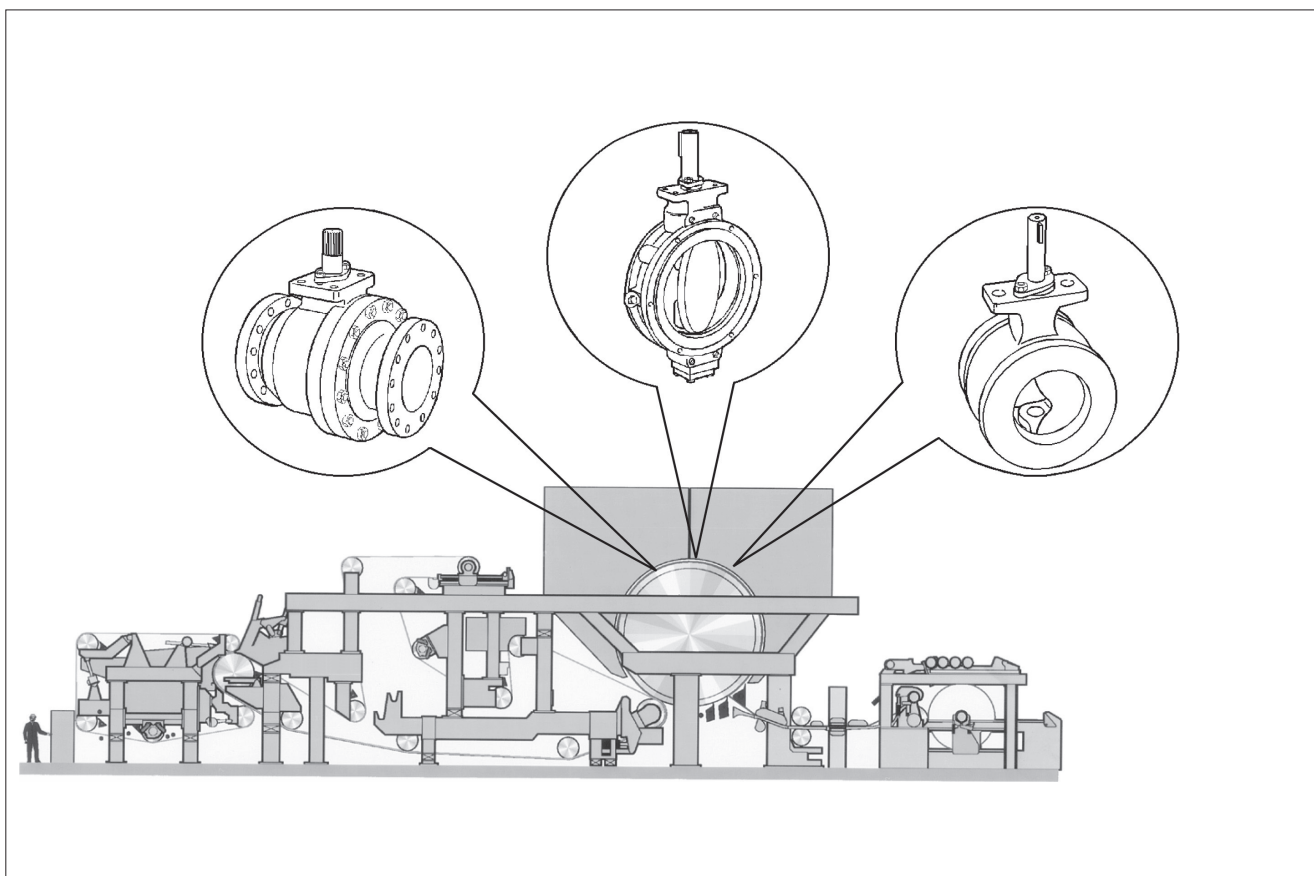


Valves for tissue paper machine steam systems



Overview of the process

The removal of water from the paper sheet on the machine starts in the wire section by using vacuum and is continued in the press section by using mechanical pressing and vacuum.

The process

To bring the sheet to the desired dryness, heat is applied to evaporate the water. This part of the machine consists of a large diameter steam-heated cylinder called a Yankee Cylinder. The total steam supply and condensate removal system varies slightly depending on the grade produced.

Result

Yankee cylinder

A tissue machine has a single-cylinder dry end. It is referred to as a Yankee Cylinder. It is a large drum (diameter up to 6 m/19 ft) and the speed of the machine can be up to 2000 m/min / 6500 ft/min. The evaporation needs to be applied very effectively and therefore the Yankee Cylinder has a ventilating hood where hot air is blown on the top.

Normally the systems are equipped with a thermocompressor (steam jet ejector) and two or three steam headers with

different pressure levels. To maintain the high pressure differential (because of the size and speed) needed to drive the condensate out of the cylinder, high pressure steam up to 15 bar (218 psi) is common for the supply steam.

Drawing on last page illustrates the steam and condensate systems and the control loops.

While heating up the cylinder, the 2" (DN 50) valve HV-06 feeds L.P. steam (2.5 bar/36 psi) gradually.

During start up, the maximum amount of 8-11 t/h M.P. steam (9 bar/130 psi) flows thru the valve PV-08. There is a thermo relay (TIS-10) which holds the pressure control loop (PIC-08) blocked until the temperature of the condensate in the separator has been exceeded. The valve FV-09 will evacuate the non-condensibles.

Valve selection

Function during the production

When the production starts, the thermocompressor starts to operate and the H.P. steam (15 bar/218 psi) joins the blowthrough steam while valve FV-09 is closed. The thermo-compressor has an automatically controlled spindle to vary the flow. It is operated by a piston or diaphragm actuator.

The cylinder pressure control valve PV-08 now controls the make-up steam (some 2.7 t/h with up to p = 6 bar/87 psi). When sizing the valve, high flow velocity, noise and possible vibration caused us to select a Neles Q-Trim™ for this demanding application.

Valve PV-08 is supplied with a 12 - 20 mA split range positioner and the thermocompressor with a 4 - 12 mA positioner. Valve FV-09 is supplied with a 12 - 20 mA reverse acting positioner. The item shown as LPS is a low pass selecting relay which will select the lowest of the signals from the pressure controller or the flow controller (blowthrough steam).

The following is important on a paper break. Pressure in the main steam header will increase because the condensing load is reduced. The make-up steam valve is tending to close. When the signal (while decreasing) becomes less than the output of the blowthrough flow control, it is automatically transferred to the thermocompressor. The signal from the flow control is now in the 12 - 20 mA range and the blowdown valve FV-09 will throttle the pressure differential, while the thermo-compressor is fully closed.

Steam box control

The automatic cross machine moisture control systems are used to reduce major upsets (streaks) in the moisture profile. A steam box under the Yankee Cylinder consists of several nozzles and steam can be applied locally to the streaks.

The temperature and pressure of the steam must be controlled accurately. In the system applied here the L.P. steam is cooled with water in the heat exchanger. The valve TV-12 controls the temperature, which varies between 100-150 °C (212-302 °F). The pressure is kept under 1 bar (15 psi) with the valve PV-11.

VALVE SELECTION			
Tag	Service	Recommended	Alternate
PV-08	Med. press steam modulating	Q-R V-port segment valve	Q-Finetrol™ eccentric plug valve
HV-06	Low press steam modulating	R series V-port segment valve	M series ball valve
FV-09	Evacuation flow construction	R series V-port segment valve	M series ball valve
LV-15	Condensate control	R series V-port segment valve	Neldisc™ triple eccentric disc valve
TV-12	Temp. control modulating	R series V-port segment valve	-----
PV-11	Low press steam modulating	R series V-port segment valve	-----

In this application the steam conditioning valve finds its place. The pressure is reduced by injecting spraywater directly into the steam flow inside a valve. Because of the high turbulence in this area, efficient mixing is ensured.

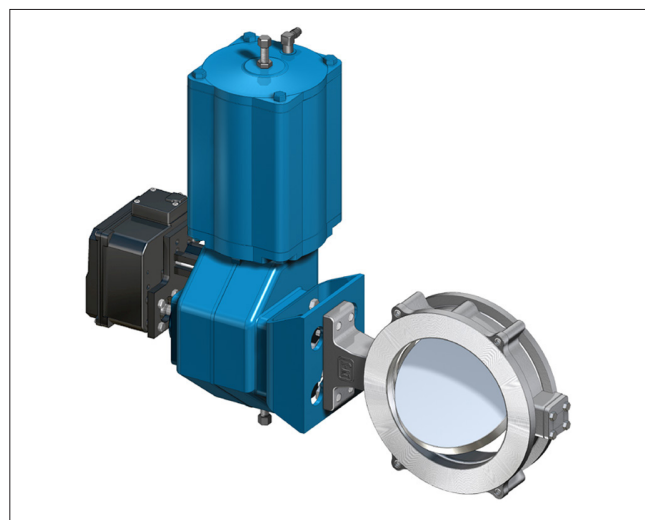
Summary

Other applications

We have the capabilities of supplying all the valves on these tissue paper machine steam and condensate systems. The metal seated valve lines of ball valve type MBV (flanged) or segment valve type RA-series (wafer) are available with or without Q-Trim. RB (flanged) is preferred for all steam and condensate metal seated butterflies L12 and LW-series and soft seated Wafer-Sphere™ 815, 830 -series are suitable for steam as they are excellent in shut-off service.



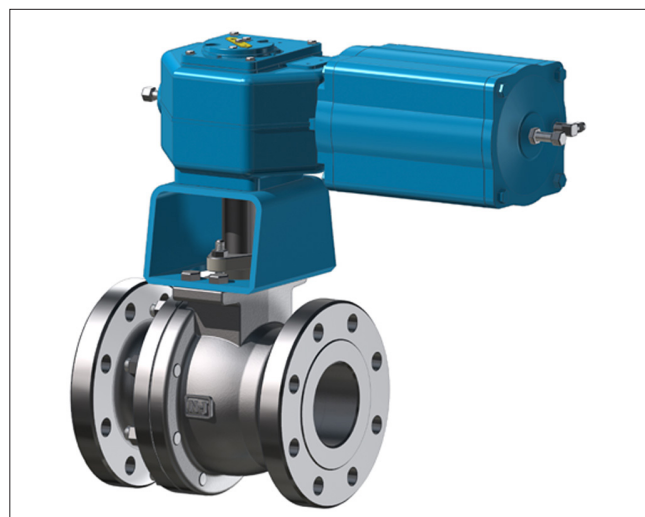
R series V-port segment valve



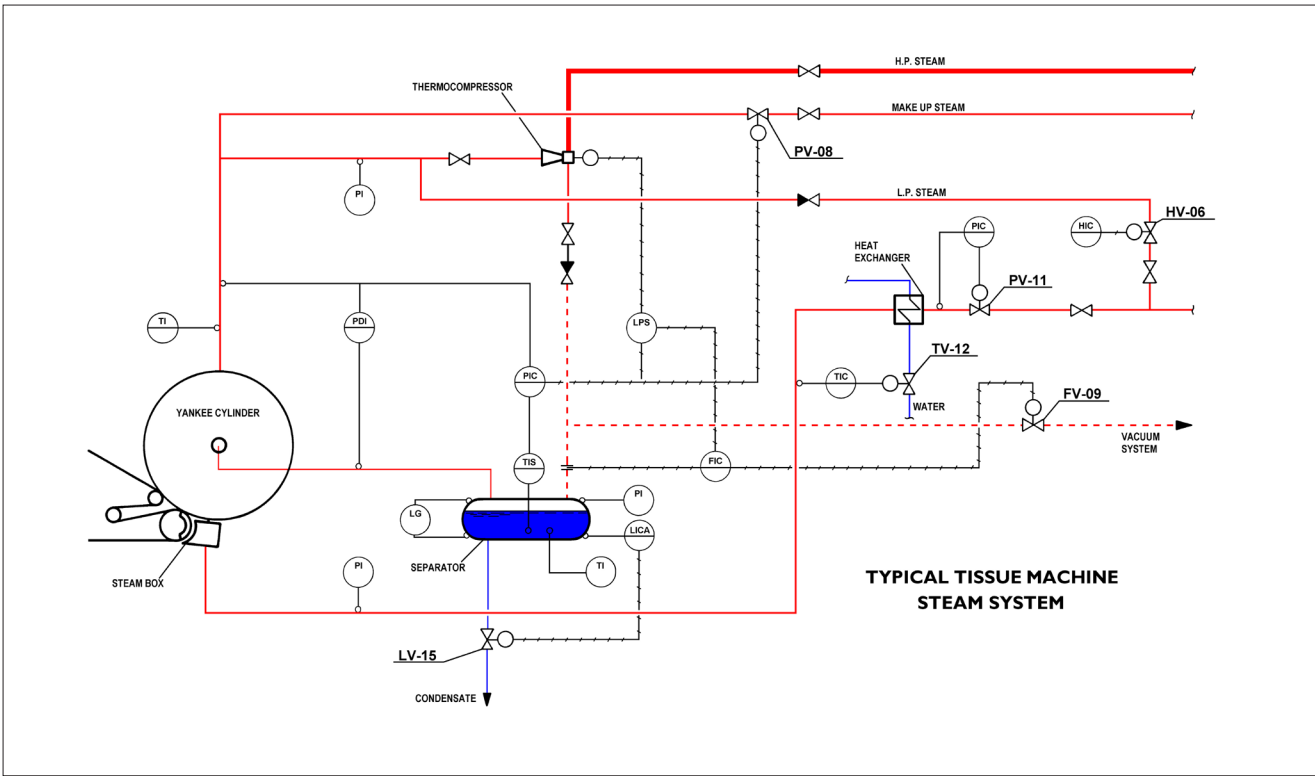
Neldisc triple eccentric disc valve



Wafer-Sphere butterfly valve



M series ball valve



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