



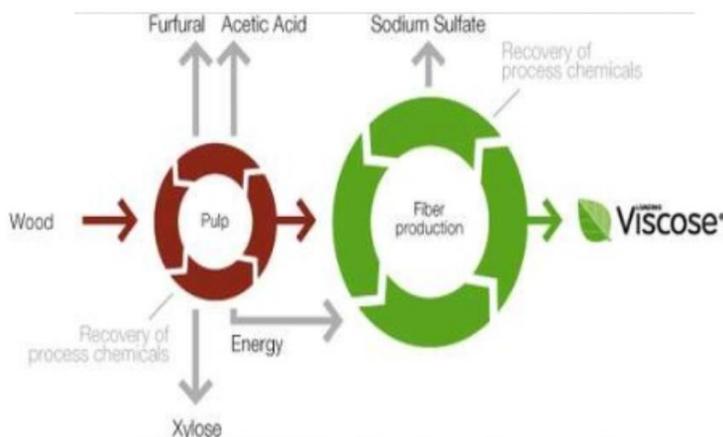
SAFI Application Sheet

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| Application / Segment : | Viscose rayon fiber plants |
| Location : | Indonesia |
| Date : | 02/11/2017 |

Introduction

Viscose fiber plants produce viscose rayon fiber which is a raw material for textile and other products, such as baby wipes, face masks, surgical gowns and medical pads. Viscose rayon is a fiber of regenerated cellulose structurally similar to cotton and produced from the pulp of bamboo or sugar cane.

There is only a small number of viscose fiber producing countries as it is labor intensive industry and needs strict waste control. China, India and Indonesia are leaders in the market and US, Europe and Japan are closing their viscose fiber industry due to a series of factors, including costs and environmental issues.



The process of manufacturing viscose rayon consists of the following steps mentioned, in the order that they are carried out: (1) Steeping, (2) Pressing, (3) Shredding, (4) Aging, (5) Xanthation, (6) Dissolving, (7) Ripening, (8) Filtering, (9) Degassing, **(10) Spinning**, (11) Drawing, (12) Washing, (13) Cutting.



The process of Spinning involves metering the viscose into a **spin bath** containing sulphuric acid, sodium sulphate and zinc sulphate.

Thermoplastic valves are used in the spin bath process in great quantities to manage the chemicals involved. Flange ball valves in GRPP and PVDF are preferred, as well as butterfly valves and non-return valves in thermoplastic, therefore SAFI valves are particularly appreciated in this industry.

Application

Spin bath application for the production of viscose Rayon:



Standard spin bath in a viscose process has the following conditions of service:

- Temperature of 40-55° C
- Sulphuric acid (H₂SO₄) -8-10%
- Sodium sulphate (Na₂SO₄) -16-24%
- Zinc sulphate (ZnSO₄) -1-2%

Specifically, several parts of the viscose plant require thermoplastic valves:

- **Additives for the spin bath** (Berol 653) produced by Akzo Nobel require PPH valves from DN 15 to 150
- **Acidic drain for the spinbath** (10% H₂SO₄) up to 55°C, require PPH valves from DN 15 to 150



- **Evaporator for the circulation bath** (H₂SO₄ 110 g/l, Na₂SO₄ 370 g/l, ZnSO₄ 12g/l) goes up to 120°C and requires PVDF valves from DN 15 to 150
- **Concentrated spinbath** (H₂SO₄ 10%) up to 60°C require PPH or PVDF valves
- **Glauber salt mother liquor** (H₂SO₄ 150 g/l, NaSO₄ 320 g/l, ZNSO₄ 10 g/l) up to 35°C require PPH or PVDF valves
- **Sulphuric acid**, diluted 70% (Spinbath to Acid Plant) up to 80°C require PVDF valves
- **Vapors from evaporator** (H₂S and CS₂ traces up to 110°C) require PVDF valves
- **Sodium hypochlorite** (NaOCL 150 g/l, 11% up to 40°C) require PVC or PPH valves
- **Second bath, spinbath distribution to machine, Spinbath return, spinbath supply** also require PPH and PVDF valves depending on temperature.

The rest of the plant uses Stainless steel and carbon steel valves

Type of thermoplastic valves needed:

- Flange ball valves up to DN 150 in CPVC, PPH/GRPP and PVDF
- Non return valves (swing and flanged) up to DN 200 in CPVC, PPH and PVDF
- Butterfly valves up to DN 250 in PPH and PVDF

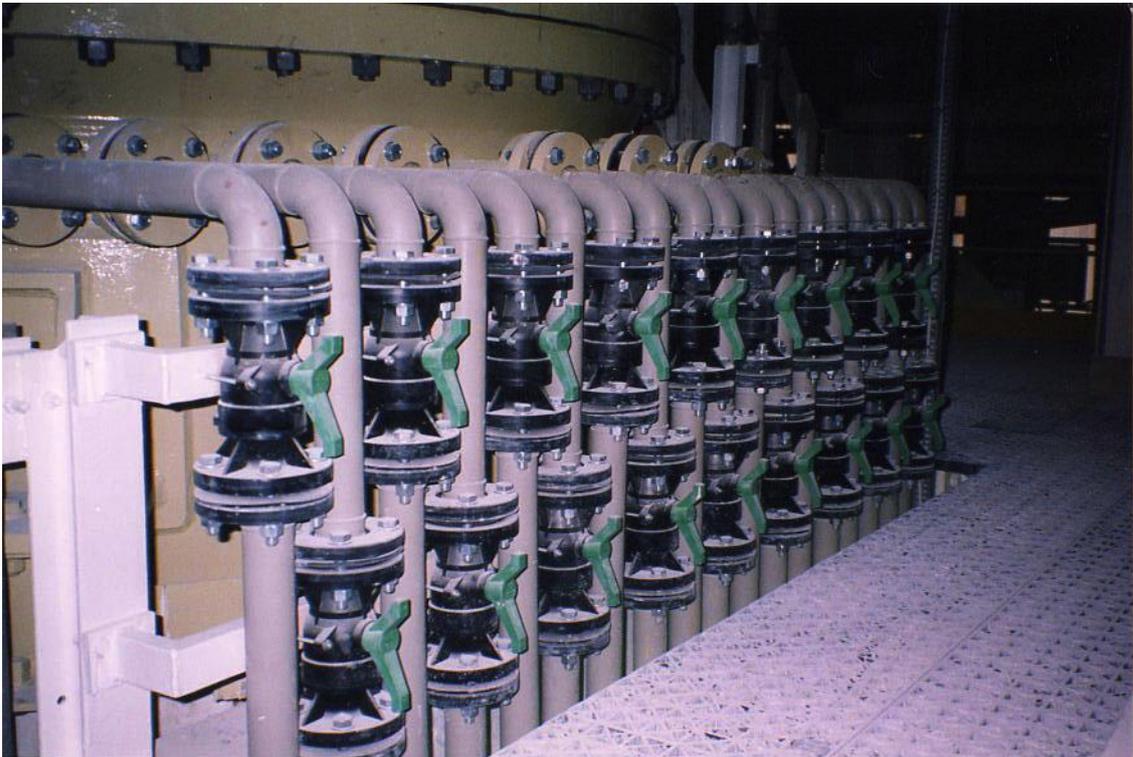
Ball valves can be actuated in certain occasions.

Exemples of SAFI valves used in the spin bath of Indo Barat rayon in 2004:





Spin bath with GRPP flange ball valves:



GRPP valve installed on the sodium hypochlorite storage system:



3/ SAFI references

Viscose plants:

- Sateri viscose plant of Royal Golden Eagle (RGE) group, Indonesia
- South Pacific Viscose, Indonesia
- Indo Bharat Rayon, Indonesia
- Lenzing, Austria
- Kalle, Germany

Pulp and paper supply to the viscose plants:

- RAPP (Riau Andalan Pulp and Paper) chemical plant, Riau Province, Sumatra, Indonesia
- IKPP (Indian Kiat Pulp and Paper) chemical plants, Riau Province, Sumatra, Indonesia

